Padhuka's

Practical Learning Series

Quantitative Aptitude

For CA Foundation New Syllabus 2023

Applicable for May 2024 Examination and onwards

with around 3600 Objective Q & A

Complete Coverage of CA Foundation Syllabus

Students' [illegible]erred Books for Self Study of CA Course

CA G. Sekar

Commercial Law Publishers (India) Pvt. Ltd.

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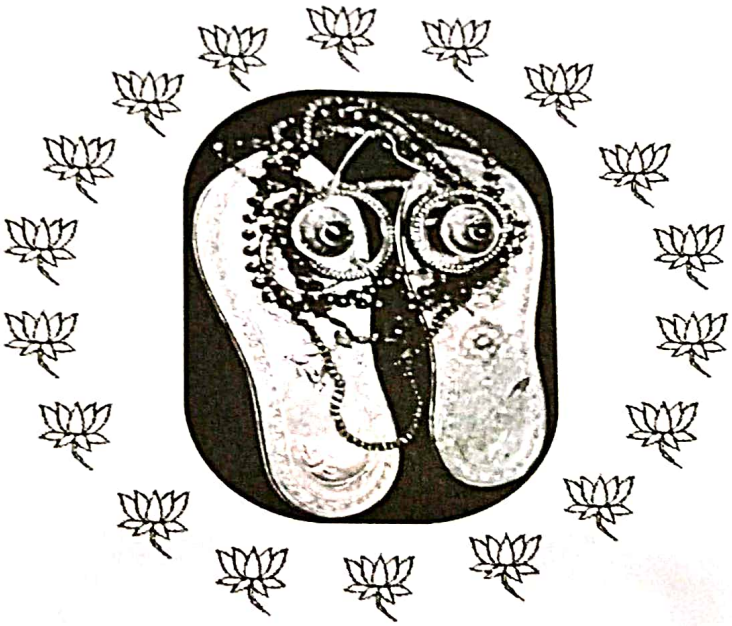
PRANAMS

TO

THE ACHARYAS OF KANCHI



Preface

In CA Foundation Level, **"Padhuka's Practical Learning Series – Quantitative Aptitude"** subject covers a important topics from Mathematics, Logical Reasoning and Statistics. The Student is expected to gain control in handling mathematical concepts, formulae and making calculations as required in each topic.

In the CA Foundation Examination, the Student is required to give answers to questions which are on Multiple Choice / Objective Type basis. Hence, the focus of learning is –

(a) know and remember the principles, concepts, formulae and procedures in Subject,

(b) read the question quickly in the exam and comprehend the same,

(c) make calculations as required, and

(d) arrive at the correct choice as the answer.

The key issue is to handle the exam questions in a **rapid, efficient and effective manner**. It is to be noted that Students are preparing for the Professional Exams and hence, **all topics / subjects** should be given equal importance.

This revised edition of the book has been prepared with a view to communicate the formulae, principles, concepts and procedures in Mathematics, Logical Reasoning ability and Statistics, and to help the Student to meet the professional examination requirements.

Special features of this updated book include –

- **Full Coverage** of Examination Syllabus.
- A Lucid presentation of all relevant concepts, with Supportive Derivations, Graphs and Diagrams wherever required.
- About 400 Illustrations, illustrating the working procedures for various problem types.
- **About 3600 Objective Type Questions and Answers**, to help the student test his knowledge in the various segments, in examination simulated conditions.
- **"Additional Questions"** which is a mixture of the various question types has been provided at the end of the Chapter. The same may be attempted by the students as a revision, after attempting the MCQ segment.

With an exhaustive coverage of all that is relevant and required for the examination, any sincere follower of this Book will be able to comfortably clear the exams with distinction.

Many Thanks to the Users of the Padhuka's Publications, for their positive feedback, which reflects the benefits they have reaped from this Book, and also their keen interest to reciprocate with constructive suggestions.

We also thank the efforts and co–operation of the various service providers in bringing out this edition including the support of the Publishers, in quickly getting this book in the current form.

Constructive Suggestions and Feedback from Users would be highly appreciated, gratefully acknowledged and suitably incorporated.

With Best Wishes

G Sekar

Chennai
July 2023

SUBJECT INDEX

Students' Note:

Past Exam Questions based on memory and Important Revisionary Questions are marked with a Star, in the Relevant MCQs section of all the topics.

SPECIAL FEATURES / ADVANTAGES OF Padhuka's PUBLICATIONS

Padhuka's Publications / Textbooks come with the following special advantages which will provide a "cutting edge" to students, in scoring high marks in the exams.

1. Comprehensive, Detailed Complete and **Full Coverage of entire syllabus** prescribed by ICAI,
2. Neat and **orderly arrangement** of all the topics given in the syllabus, into identifiable Chapters,
3. Systematic **arrangement** of all concepts in a Chapter,
4. **"Chapter Overview"** at the beginning of every Chapter, to help navigate the contents better,
5. Use of Flowcharts, Diagrams, Charts, Tables, etc. for **effective communication** of concepts,
6. Presentation of all concepts in a neat **Student Friendly format, in the same manner as the Student is expected to give his answer in the Main Examinations,**
7. **Detailed Step–by–Step Explanation of Illustrations, in the same manner as the student is expected to present his answer in the Main Exams,**
8. Full Coverage of all questions / illustration / problem types in a Chapter,
9. Use of simple language and effective presentation style, to meet the needs of **all categories of students** – (a) CBSE / Matric / State Board background, (b) English Medium / Regional Language Medium background, (c) Commerce / Non–Commerce background, etc.
10. **Complete Answers to about All Past Main Exams Questions,**
11. Inclusion of Questions & Answers from all the **"Revision Test Papers"** provided by the ICAI,
12. Additional **Exercises, Case Studies**, etc. with final answers thereto, to strengthen the students' hold / command over the subject,
13. **Query Facility** – for getting doubts clarified through e–mail **cabooks@shrigurukripa.com,**
14. **Update Facility** – for getting recent announcements, latest amendments to law, latest updates, etc. through **www.shrigurukripa.com**
15. In short, **a single window for sure success in the CA Exams under Self–Study Method.**

INDEX TO TABLES

Present Value Interest Factor (R,n) = $\frac{1}{(1+R)^n}$ (Discounting Factor of a Single Cash Flow)

Years	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909
2	0.980	0.961	0.943	0.925	0.907	0.890	0.873	0.857	0.842	0.826
3	0.971	0.942	0.915	0.889	0.864	0.840	0.816	0.794	0.772	0.751
4	0.961	0.924	0.888	0.855	0.823	0.792	0.763	0.735	0.708	0.683
5	0.951	0.906	0.863	0.822	0.784	0.747	0.713	0.681	0.650	0.621
6	0.942	0.888	0.837	0.790	0.746	0.705	0.666	0.630	0.596	0.564
7	0.933	0.871	0.813	0.760	0.711	0.665	0.623	0.583	0.547	0.513
8	0.923	0.853	0.789	0.731	0.677	0.627	0.582	0.540	0.502	0.467
9	0.914	0.837	0.766	0.703	0.645	0.592	0.544	0.500	0.460	0.424
10	0.905	0.820	0.744	0.676	0.614	0.558	0.508	0.463	0.422	0.386
11	0.896	0.804	0.722	0.650	0.585	0.527	0.475	0.429	0.388	0.350
12	0.887	0.788	0.701	0.625	0.557	0.497	0.444	0.397	0.356	0.319
13	0.879	0.773	0.681	0.601	0.530	0.469	0.415	0.368	0.326	0.290
14	0.870	0.758	0.661	0.577	0.505	0.442	0.388	0.340	0.299	0.263
15	0.861	0.743	0.642	0.555	0.481	0.417	0.362	0.315	0.275	0.239
16	0.853	0.728	0.623	0.534	0.458	0.394	0.339	0.292	0.252	0.218
17	0.844	0.714	0.605	0.513	0.436	0.371	0.317	0.270	0.231	0.198
18	0.836	0.700	0.587	0.494	0.416	0.350	0.296	0.250	0.212	0.180
19	0.828	0.686	0.570	0.475	0.396	0.331	0.277	0.232	0.194	0.164
20	0.820	0.673	0.554	0.456	0.377	0.312	0.258	0.215	0.178	0.149
21	0.811	0.660	0.538	0.439	0.359	0.294	0.242	0.199	0.164	0.135
22	0.803	0.647	0.522	0.422	0.342	0.278	0.226	0.184	0.150	0.123
23	0.795	0.634	0.507	0.406	0.326	0.262	0.211	0.170	0.138	0.112
24	0.788	0.622	0.492	0.390	0.310	0.247	0.197	0.158	0.126	0.102
25	0.780	0.610	0.478	0.375	0.295	0.233	0.184	0.146	0.116	0.092

Years	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1	0.901	0.893	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833
2	0.812	0.797	0.783	0.769	0.756	0.743	0.731	0.718	0.706	0.694
3	0.731	0.712	0.693	0.675	0.658	0.641	0.624	0.609	0.593	0.579
4	0.659	0.636	0.613	0.592	0.572	0.552	0.534	0.516	0.499	0.482
5	0.593	0.567	0.543	0.519	0.497	0.476	0.456	0.437	0.419	0.402
6	0.535	0.507	0.480	0.456	0.432	0.410	0.390	0.370	0.352	0.335
7	0.482	0.452	0.425	0.400	0.376	0.354	0.333	0.314	0.296	0.279
8	0.434	0.404	0.376	0.351	0.327	0.305	0.285	0.266	0.249	0.233
9	0.391	0.361	0.333	0.308	0.284	0.263	0.243	0.225	0.209	0.194
10	0.352	0.322	0.295	0.270	0.247	0.227	0.208	0.191	0.176	0.162
11	0.317	0.287	0.261	0.237	0.215	0.195	0.178	0.162	0.148	0.135
12	0.286	0.257	0.231	0.208	0.187	0.168	0.152	0.137	0.124	0.112
13	0.258	0.229	0.204	0.182	0.163	0.145	0.130	0.116	0.104	0.093
14	0.232	0.205	0.181	0.160	0.141	0.125	0.111	0.099	0.088	0.078
15	0.209	0.183	0.160	0.140	0.123	0.108	0.095	0.084	0.074	0.065
16	0.188	0.163	0.141	0.123	0.107	0.093	0.081	0.071	0.062	0.054
17	0.170	0.146	0.125	0.108	0.093	0.080	0.069	0.060	0.052	0.045
18	0.153	0.130	0.111	0.095	0.081	0.069	0.059	0.051	0.044	0.038
19	0.138	0.116	0.098	0.083	0.070	0.060	0.051	0.043	0.037	0.031
20	0.124	0.104	0.087	0.073	0.061	0.051	0.043	0.037	0.031	0.026
21	0.112	0.093	0.077	0.064	0.053	0.044	0.037	0.031	0.026	0.022
22	0.101	0.083	0.068	0.056	0.046	0.038	0.032	0.026	0.022	0.018
23	0.091	0.074	0.060	0.049	0.040	0.033	0.027	0.022	0.018	0.015
24	0.082	0.066	0.053	0.043	0.035	0.028	0.023	0.019	0.015	0.013
25	0.074	0.059	0.047	0.038	0.030	0.024	0.020	0.016	0.013	0.010

Present Value Interest Factor (R,n) = $\frac{1}{(1+R)^n}$ (Discounting Factor of a Single Cash Flow)

Years	21%	22%	23%	24%	25%	26%	27%	28%	29%	30%
0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1	0.826	0.820	0.813	0.806	0.800	0.794	0.787	0.781	0.775	0.769
2	0.683	0.672	0.661	0.650	0.640	0.630	0.620	0.610	0.601	0.592
3	0.564	0.551	0.537	0.524	0.512	0.500	0.488	0.477	0.466	0.455
4	0.467	0.451	0.437	0.423	0.410	0.397	0.384	0.373	0.361	0.350
5	0.386	0.370	0.355	0.341	0.328	0.315	0.303	0.291	0.280	0.269
6	0.319	0.303	0.289	0.275	0.262	0.250	0.238	0.227	0.217	0.207
7	0.263	0.249	0.235	0.222	0.210	0.198	0.188	0.178	0.168	0.159
8	0.218	0.204	0.191	0.179	0.168	0.157	0.148	0.139	0.130	0.123
9	0.180	0.167	0.155	0.144	0.134	0.125	0.116	0.108	0.101	0.094
10	0.149	0.137	0.126	0.116	0.107	0.099	0.092	0.085	0.078	0.073
11	0.123	0.112	0.103	0.094	0.086	0.079	0.072	0.066	0.061	0.056
12	0.102	0.092	0.083	0.076	0.069	0.062	0.057	0.052	0.047	0.043
13	0.084	0.075	0.068	0.061	0.055	0.050	0.045	0.040	0.037	0.033
14	0.069	0.062	0.055	0.049	0.044	0.039	0.035	0.032	0.028	0.025
15	0.057	0.051	0.045	0.040	0.035	0.031	0.028	0.025	0.022	0.020
16	0.047	0.042	0.036	0.032	0.028	0.025	0.022	0.019	0.017	0.015
17	0.039	0.034	0.030	0.026	0.023	0.020	0.017	0.015	0.013	0.012
18	0.032	0.028	0.024	0.021	0.018	0.016	0.014	0.012	0.010	0.009
19	0.027	0.023	0.020	0.017	0.014	0.012	0.011	0.009	0.008	0.007
20	0.022	0.019	0.016	0.014	0.012	0.010	0.008	0.007	0.006	0.005
21	0.018	0.015	0.013	0.011	0.009	0.008	0.007	0.006	0.005	0.004
22	0.015	0.013	0.011	0.009	0.007	0.006	0.005	0.004	0.004	0.003
23	0.012	0.010	0.009	0.007	0.006	0.005	0.004	0.003	0.003	0.002
24	0.010	0.008	0.007	0.006	0.005	0.004	0.003	0.003	0.002	0.002
25	0.009	0.007	0.006	0.005	0.004	0.003	0.003	0.002	0.002	0.001

Years	31%	32%	33%	34%	35%	36%	37%	38%	39%	40%
0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1	0.763	0.758	0.752	0.746	0.741	0.735	0.730	0.725	0.719	0.714
2	0.583	0.574	0.565	0.557	0.549	0.541	0.533	0.525	0.518	0.510
3	0.445	0.435	0.425	0.416	0.406	0.398	0.389	0.381	0.372	0.364
4	0.340	0.329	0.320	0.310	0.301	0.292	0.284	0.276	0.268	0.260
5	0.259	0.250	0.240	0.231	0.223	0.215	0.207	0.200	0.193	0.186
6	0.198	0.189	0.181	0.173	0.165	0.158	0.151	0.145	0.139	0.133
7	0.151	0.143	0.136	0.129	0.122	0.116	0.110	0.105	0.100	0.095
8	0.115	0.108	0.102	0.096	0.091	0.085	0.081	0.076	0.072	0.068
9	0.088	0.082	0.077	0.072	0.067	0.063	0.059	0.055	0.052	0.048
10	0.067	0.062	0.058	0.054	0.050	0.046	0.043	0.040	0.037	0.035
11	0.051	0.047	0.043	0.040	0.037	0.034	0.031	0.029	0.027	0.025
12	0.039	0.036	0.033	0.030	0.027	0.025	0.023	0.021	0.019	0.018
13	0.030	0.027	0.025	0.022	0.020	0.018	0.017	0.015	0.014	0.013
14	0.023	0.021	0.018	0.017	0.015	0.014	0.012	0.011	0.010	0.009
15	0.017	0.016	0.014	0.012	0.011	0.010	0.009	0.008	0.007	0.006
16	0.013	0.012	0.010	0.009	0.008	0.007	0.006	0.006	0.005	0.005
17	0.010	0.009	0.008	0.007	0.006	0.005	0.005	0.004	0.004	0.003
18	0.008	0.007	0.006	0.005	0.005	0.004	0.003	0.003	0.003	0.002
19	0.006	0.005	0.004	0.004	0.003	0.003	0.003	0.002	0.002	0.002
20	0.005	0.004	0.003	0.003	0.002	0.002	0.002	0.002	0.001	0.001
21	0.003	0.003	0.003	0.002	0.002	0.002	0.001	0.001	0.001	0.001
22	0.003	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001
23	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000
24	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000
25	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000

Present Value Annuity Factor (R,m) = $\frac{1 - \frac{1}{(1+R)^m}}{R}$ **(Discounting Factor of an Annuity)**

Years	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909
2	1.970	1.942	1.913	1.886	1.859	1.833	1.808	1.783	1.759	1.736
3	2.941	2.884	2.829	2.775	2.723	2.673	2.624	2.577	2.531	2.487
4	3.902	3.808	3.717	3.630	3.546	3.465	3.387	3.312	3.240	3.170
5	4.853	4.713	4.580	4.452	4.329	4.212	4.100	3.993	3.890	3.791
6	5.795	5.601	5.417	5.242	5.076	4.917	4.767	4.623	4.486	4.355
7	6.728	6.472	6.230	6.002	5.786	5.582	5.389	5.206	5.033	4.868
8	7.652	7.325	7.020	6.733	6.463	6.210	5.971	5.747	5.535	5.335
9	8.566	8.162	7.786	7.435	7.108	6.802	6.515	6.247	5.995	5.759
10	9.471	8.983	8.530	8.111	7.722	7.360	7.024	6.710	6.418	6.145
11	10.368	9.787	9.253	8.760	8.306	7.887	7.499	7.139	6.805	6.495
12	11.255	10.575	9.954	9.385	8.863	8.384	7.943	7.536	7.161	6.814
13	12.134	11.348	10.635	9.986	9.394	8.853	8.358	7.904	7.487	7.103
14	13.004	12.106	11.296	10.563	9.899	9.295	8.745	8.244	7.786	7.367
15	13.865	12.849	11.938	11.118	10.380	9.712	9.108	8.559	8.061	7.606
16	14.718	13.578	12.561	11.652	10.838	10.106	9.447	8.851	8.313	7.824
17	15.562	14.292	13.166	12.166	11.274	10.477	9.763	9.122	8.544	8.022
18	16.398	14.992	13.754	12.659	11.690	10.828	10.059	9.372	8.756	8.201
19	17.226	15.678	14.324	13.134	12.085	11.158	10.336	9.604	8.950	8.365
20	18.046	16.351	14.877	13.590	12.462	11.470	10.594	9.818	9.129	8.514
21	18.857	17.011	15.415	14.029	12.821	11.764	10.836	10.017	9.292	8.649
22	19.660	17.658	15.937	14.451	13.163	12.042	11.061	10.201	9.442	8.772
23	20.456	18.292	16.444	14.857	13.489	12.303	11.272	10.371	9.580	8.883
24	21.243	18.914	16.936	15.247	13.799	12.550	11.469	10.529	9.707	8.985
25	22.023	19.523	17.413	15.622	14.094	12.783	11.654	10.675	9.823	9.077

Years	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	0.901	0.893	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833
2	1.713	1.690	1.668	1.647	1.626	1.605	1.585	1.566	1.547	1.528
3	2.444	2.402	2.361	2.322	2.283	2.246	2.210	2.174	2.140	2.106
4	3.102	3.037	2.974	2.914	2.855	2.798	2.743	2.690	2.639	2.589
5	3.696	3.605	3.517	3.433	3.352	3.274	3.199	3.127	3.058	2.991
6	4.231	4.111	3.998	3.889	3.784	3.685	3.589	3.498	3.410	3.326
7	4.712	4.564	4.423	4.288	4.160	4.039	3.922	3.812	3.706	3.605
8	5.146	4.968	4.799	4.639	4.487	4.344	4.207	4.078	3.954	3.837
9	5.537	5.328	5.132	4.946	4.772	4.607	4.451	4.303	4.163	4.031
10	5.889	5.650	5.426	5.216	5.019	4.833	4.659	4.494	4.339	4.192
11	6.207	5.938	5.687	5.453	5.234	5.029	4.836	4.656	4.486	4.327
12	6.492	6.194	5.918	5.660	5.421	5.197	4.988	4.793	4.611	4.439
13	6.750	6.424	6.122	5.842	5.583	5.342	5.118	4.910	4.715	4.533
14	6.982	6.628	6.302	6.002	5.724	5.468	5.229	5.008	4.802	4.611
15	7.191	6.811	6.462	6.142	5.847	5.575	5.324	5.092	4.876	4.675
16	7.379	6.974	6.604	6.265	5.954	5.668	5.405	5.162	4.938	4.730
17	7.549	7.120	6.729	6.373	6.047	5.749	5.475	5.222	4.990	4.775
18	7.702	7.250	6.840	6.467	6.128	5.818	5.534	5.273	5.033	4.812
19	7.839	7.366	6.938	6.550	6.198	5.877	5.584	5.316	5.070	4.843
20	7.963	7.469	7.025	6.623	6.259	5.929	5.628	5.353	5.101	4.870
21	8.075	7.562	7.102	6.687	6.312	5.973	5.665	5.384	5.127	4.891
22	8.176	7.645	7.170	6.743	6.359	6.011	5.696	5.410	5.149	4.909
23	8.266	7.718	7.230	6.792	6.399	6.044	5.723	5.432	5.167	4.925
24	8.348	7.784	7.283	6.835	6.434	6.073	5.746	5.451	5.182	4.937
25	8.422	7.843	7.330	6.873	6.464	6.097	5.766	5.467	5.195	4.948

Present Value Annuity Factor (R,m) = $\frac{1 - \frac{1}{(1+R)^m}}{R}$ **(Discounting Factor of an Annuity)**

Years	21%	22%	23%	24%	25%	26%	27%	28%	29%	30%
1	0.826	0.820	0.813	0.806	0.800	0.794	0.787	0.781	0.775	0.769
2	1.509	1.492	1.474	1.457	1.440	1.424	1.407	1.392	1.376	1.361
3	2.074	2.042	2.011	1.981	1.952	1.923	1.896	1.868	1.842	1.816
4	2.540	2.494	2.448	2.404	2.362	2.320	2.280	2.241	2.203	2.166
5	2.926	2.864	2.803	2.745	2.689	2.635	2.583	2.532	2.483	2.436
6	3.245	3.167	3.092	3.020	2.951	2.885	2.821	2.759	2.700	2.643
7	3.508	3.416	3.327	3.242	3.161	3.083	3.009	2.937	2.868	2.802
8	3.726	3.619	3.518	3.421	3.329	3.241	3.156	3.076	2.999	2.925
9	3.905	3.786	3.673	3.566	3.463	3.366	3.273	3.184	3.100	3.019
10	4.054	3.923	3.799	3.682	3.571	3.465	3.364	3.269	3.178	3.092
11	4.177	4.035	3.902	3.776	3.656	3.543	3.437	3.335	3.239	3.147
12	4.278	4.127	3.985	3.851	3.725	3.606	3.493	3.387	3.286	3.190
13	4.362	4.203	4.053	3.912	3.780	3.656	3.538	3.427	3.322	3.223
14	4.432	4.265	4.108	3.962	3.824	3.695	3.573	3.459	3.351	3.249
15	4.489	4.315	4.153	4.001	3.859	3.726	3.601	3.483	3.373	3.268
16	4.536	4.357	4.189	4.033	3.887	3.751	3.623	3.503	3.390	3.283
17	4.576	4.391	4.219	4.059	3.910	3.771	3.640	3.518	3.403	3.295
18	4.608	4.419	4.243	4.080	3.928	3.786	3.654	3.529	3.413	3.304
19	4.635	4.442	4.263	4.097	3.942	3.799	3.664	3.539	3.421	3.311
20	4.657	4.460	4.279	4.110	3.954	3.808	3.673	3.546	3.427	3.316
21	4.675	4.476	4.292	4.121	3.963	3.816	3.679	3.551	3.432	3.320
22	4.690	4.488	4.302	4.130	3.970	3.822	3.684	3.556	3.436	3.323
23	4.703	4.499	4.311	4.137	3.976	3.827	3.689	3.559	3.438	3.325
24	4.713	4.507	4.318	4.143	3.981	3.831	3.692	3.562	3.441	3.327
25	4.721	4.514	4.323	4.147	3.985	3.834	3.694	3.564	3.442	3.329

Years	31%	32%	33%	34%	35%	36%	37%	38%	39%	40%
1	0.763	0.758	0.752	0.746	0.741	0.735	0.730	0.725	0.719	0.714
2	1.346	1.331	1.317	1.303	1.289	1.276	1.263	1.250	1.237	1.224
3	1.791	1.766	1.742	1.719	1.696	1.673	1.652	1.630	1.609	1.589
4	2.130	2.096	2.062	2.029	1.997	1.966	1.935	1.906	1.877	1.849
5	2.390	2.345	2.302	2.260	2.220	2.181	2.143	2.106	2.070	2.035
6	2.588	2.534	2.483	2.433	2.385	2.339	2.294	2.251	2.209	2.168
7	2.739	2.677	2.619	2.562	2.508	2.455	2.404	2.355	2.308	2.263
8	2.854	2.786	2.721	2.658	2.598	2.540	2.485	2.432	2.380	2.331
9	2.942	2.868	2.798	2.730	2.665	2.603	2.544	2.487	2.432	2.379
10	3.009	2.930	2.855	2.784	2.715	2.649	2.587	2.527	2.469	2.414
11	3.060	2.978	2.899	2.824	2.752	2.683	2.618	2.555	2.496	2.438
12	3.100	3.013	2.931	2.853	2.779	2.708	2.641	2.576	2.515	2.456
13	3.129	3.040	2.956	2.876	2.799	2.727	2.658	2.592	2.529	2.469
14	3.152	3.061	2.974	2.892	2.814	2.740	2.670	2.603	2.539	2.478
15	3.170	3.076	2.988	2.905	2.825	2.750	2.679	2.611	2.546	2.484
16	3.183	3.088	2.999	2.914	2.834	2.757	2.685	2.616	2.551	2.489
17	3.193	3.097	3.007	2.921	2.840	2.763	2.690	2.621	2.555	2.492
18	3.201	3.104	3.012	2.926	2.844	2.767	2.693	2.624	2.557	2.494
19	3.207	3.109	3.017	2.930	2.848	2.770	2.696	2.626	2.559	2.496
20	3.211	3.113	3.020	2.933	2.850	2.772	2.698	2.627	2.561	2.497
21	3.215	3.116	3.023	2.935	2.852	2.773	2.699	2.629	2.562	2.498
22	3.217	3.118	3.025	2.936	2.853	2.775	2.700	2.629	2.562	2.498
23	3.219	3.120	3.026	2.938	2.854	2.775	2.701	2.630	2.563	2.499
24	3.221	3.121	3.027	2.939	2.855	2.776	2.701	2.630	2.563	2.499
25	3.222	3.122	3.028	2.939	2.856	2.777	2.702	2.631	2.563	2.499

Future Value Interest Factor (R, n) = (1 + R)" (Compounding Factor of a Single Cash Flow)

Years	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	1.010	1.020	1.030	1.040	1.050	1.060	1.070	1.080	1.090	1.100
2	1.020	1.040	1.061	1.082	1.103	1.124	1.145	1.166	1.188	1.210
3	1.030	1.061	1.093	1.125	1.158	1.191	1.225	1.260	1.295	1.331
4	1.041	1.082	1.126	1.170	1.216	1.262	1.311	1.360	1.412	1.464
5	1.051	1.104	1.159	1.217	1.276	1.338	1.403	1.469	1.539	1.611
6	1.062	1.126	1.194	1.265	1.340	1.419	1.501	1.587	1.677	1.772
7	1.072	1.149	1.230	1.316	1.407	1.504	1.606	1.714	1.828	1.949
8	1.083	1.172	1.267	1.369	1.477	1.594	1.718	1.851	1.993	2.144
9	1.094	1.195	1.305	1.423	1.551	1.689	1.838	1.999	2.172	2.358
10	1.105	1.219	1.344	1.480	1.629	1.791	1.967	2.159	2.367	2.594
11	1.116	1.243	1.384	1.539	1.710	1.898	2.105	2.332	2.580	2.853
12	1.127	1.268	1.426	1.601	1.796	2.012	2.252	2.518	2.813	3.138
13	1.138	1.294	1.469	1.665	1.886	2.133	2.410	2.720	3.066	3.452
14	1.149	1.319	1.513	1.732	1.980	2.261	2.579	2.937	3.342	3.797
15	1.161	1.346	1.558	1.801	2.079	2.397	2.759	3.172	3.642	4.177
16	1.173	1.373	1.605	1.873	2.183	2.540	2.952	3.426	3.970	4.595
17	1.184	1.400	1.653	1.948	2.292	2.693	3.159	3.700	4.328	5.054
18	1.196	1.428	1.702	2.026	2.407	2.854	3.380	3.996	4.717	5.560
19	1.208	1.457	1.754	2.107	2.527	3.026	3.617	4.316	5.142	6.116
20	1.220	1.486	1.806	2.191	2.653	3.207	3.870	4.661	5.604	6.727
21	1.232	1.516	1.860	2.279	2.786	3.400	4.141	5.034	6.109	7.400
22	1.245	1.546	1.916	2.370	2.925	3.604	4.430	5.437	6.659	8.140
23	1.257	1.577	1.974	2.465	3.072	3.820	4.741	5.871	7.258	8.954
24	1.270	1.608	2.033	2.563	3.225	4.049	5.072	6.341	7.911	9.850
25	1.282	1.641	2.094	2.666	3.386	4.292	5.427	6.848	8.623	10.835

Years	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	1.110	1.120	1.130	1.140	1.150	1.160	1.170	1.180	1.190	1.200
2	1.232	1.254	1.277	1.300	1.323	1.346	1.369	1.392	1.416	1.440
3	1.368	1.405	1.443	1.482	1.521	1.561	1.602	1.643	1.685	1.728
4	1.518	1.574	1.630	1.689	1.749	1.811	1.874	1.939	2.005	2.074
5	1.685	1.762	1.842	1.925	2.011	2.100	2.192	2.288	2.386	2.488
6	1.870	1.974	2.082	2.195	2.313	2.436	2.565	2.700	2.840	2.986
7	2.076	2.211	2.353	2.502	2.660	2.826	3.001	3.185	3.379	3.583
8	2.305	2.476	2.658	2.853	3.059	3.278	3.511	3.759	4.021	4.300
9	2.558	2.773	3.004	3.252	3.518	3.803	4.108	4.435	4.785	5.160
10	2.839	3.106	3.395	3.707	4.046	4.411	4.807	5.234	5.695	6.192
11	3.152	3.479	3.836	4.226	4.652	5.117	5.624	6.176	6.777	7.430
12	3.498	3.896	4.335	4.818	5.350	5.936	6.580	7.288	8.064	8.916
13	3.883	4.363	4.898	5.492	6.153	6.886	7.699	8.599	9.596	10.699
14	4.310	4.887	5.535	6.261	7.076	7.988	9.007	10.147	11.420	12.839
15	4.785	5.474	6.254	7.138	8.137	9.266	10.539	11.974	13.590	15.407
16	5.311	6.130	7.067	8.137	9.358	10.748	12.330	14.129	16.172	18.488
17	5.895	6.866	7.986	9.276	10.761	12.468	14.426	16.672	19.244	22.186
18	6.544	7.690	9.024	10.575	12.375	14.463	16.879	19.673	22.901	26.623
19	7.263	8.613	10.197	12.056	14.232	16.777	19.748	23.214	27.252	31.948
20	8.062	9.646	11.523	13.743	16.367	19.461	23.106	27.393	32.429	38.338
21	8.949	10.804	13.021	15.668	18.822	22.574	27.034	32.324	38.591	46.005
22	9.934	12.100	14.714	17.861	21.645	26.186	31.629	38.142	45.923	55.206
23	11.026	13.552	16.627	20.362	24.891	30.376	37.006	45.008	54.649	66.247
24	12.239	15.179	18.788	23.212	28.625	35.236	43.297	53.109	65.032	79.497
25	13.585	17.000	21.231	26.462	32.919	40.874	50.658	62.669	77.388	95.396

Future Value Annuity Factor (R,n) = $\frac{(1+R)^n - 1}{R}$ (Compounding Factor of an Annuity)

Years	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	2.010	2.020	2.030	2.040	2.050	2.060	2.070	2.080	2.090	2.100
3	3.030	3.060	3.091	3.122	3.153	3.184	3.215	3.246	3.278	3.310
4	4.060	4.122	4.184	4.246	4.310	4.375	4.440	4.506	4.573	4.641
5	5.101	5.204	5.309	5.416	5.526	5.637	5.751	5.867	5.985	6.105
6	6.152	6.308	6.468	6.633	6.802	6.975	7.153	7.336	7.523	7.716
7	7.214	7.434	7.662	7.898	8.142	8.394	8.654	8.923	9.200	9.487
8	8.286	8.583	8.892	9.214	9.549	9.897	10.260	10.637	11.028	11.436
9	9.369	9.755	10.159	10.583	11.027	11.491	11.978	12.488	13.021	13.579
10	10.462	10.950	11.464	12.006	12.578	13.181	13.816	14.487	15.193	15.937
11	11.567	12.169	12.808	13.486	14.207	14.972	15.784	16.645	17.560	18.531
12	12.683	13.412	14.192	15.026	15.917	16.870	17.888	18.977	20.141	21.384
13	13.809	14.680	15.618	16.627	17.713	18.882	20.141	21.495	22.953	24.523
14	14.947	15.974	17.086	18.292	19.599	21.015	22.550	24.215	26.019	27.975
15	16.097	17.293	18.599	20.024	21.579	23.276	25.129	27.152	29.361	31.772
16	17.258	18.639	20.157	21.825	23.657	25.673	27.888	30.324	33.003	35.950
17	18.430	20.012	21.762	23.698	25.840	28.213	30.840	33.750	36.974	40.545
18	19.615	21.412	23.414	25.645	28.132	30.906	33.999	37.450	41.301	45.599
19	20.811	22.841	25.117	27.671	30.539	33.760	37.379	41.446	46.018	51.159
20	22.019	24.297	26.870	29.778	33.066	36.786	40.995	45.762	51.160	57.275
21	23.239	25.783	28.676	31.969	35.719	39.993	44.865	50.423	56.765	64.002
22	24.472	27.299	30.537	34.248	38.505	43.392	49.006	55.457	62.873	71.403
23	25.716	28.845	32.453	36.618	41.430	46.996	53.436	60.893	69.532	79.543
24	26.973	30.422	34.426	39.083	44.502	50.816	58.177	66.765	76.790	88.497
25	28.243	32.030	36.459	41.646	47.727	54.865	63.249	73.106	84.701	98.347

Years	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	2.110	2.120	2.130	2.140	2.150	2.160	2.170	2.180	2.190	2.200
3	3.342	3.374	3.407	3.440	3.473	3.506	3.539	3.572	3.606	3.640
4	4.710	4.779	4.850	4.921	4.993	5.066	5.141	5.215	5.291	5.368
5	6.228	6.353	6.480	6.610	6.742	6.877	7.014	7.154	7.297	7.442
6	7.913	8.115	8.323	8.536	8.754	8.977	9.207	9.442	9.683	9.930
7	9.783	10.089	10.405	10.730	11.067	11.414	11.772	12.142	12.523	12.916
8	11.859	12.300	12.757	13.233	13.727	14.240	14.773	15.327	15.902	16.499
9	14.164	14.776	15.416	16.085	16.786	17.519	18.285	19.086	19.923	20.799
10	16.722	17.549	18.420	19.337	20.304	21.321	22.393	23.521	24.709	25.959
11	19.561	20.655	21.814	23.045	24.349	25.733	27.200	28.755	30.404	32.150
12	22.713	24.133	25.650	27.271	29.002	30.850	32.824	34.931	37.180	39.581
13	26.212	28.029	29.985	32.089	34.352	36.786	39.404	42.219	45.244	48.497
14	30.095	32.393	34.883	37.581	40.505	43.672	47.103	50.818	54.841	59.196
15	34.405	37.280	40.417	43.842	47.580	51.660	56.110	60.965	66.261	72.035
16	39.190	42.753	46.672	50.980	55.717	60.925	66.649	72.939	79.850	87.442
17	44.501	48.884	53.739	59.118	65.075	71.673	78.979	87.068	96.022	105.931
18	50.396	55.750	61.725	68.394	75.836	84.141	93.406	103.740	115.266	128.117
19	56.939	63.440	70.749	78.969	88.212	98.603	110.285	123.414	138.166	154.740
20	64.203	72.052	80.947	91.025	102.444	115.380	130.033	146.628	165.418	186.688
21	72.265	81.699	92.470	104.768	118.810	134.841	153.139	174.021	197.847	225.026
22	81.214	92.503	105.491	120.436	137.632	157.415	180.172	206.345	236.438	271.031
23	91.148	104.603	120.205	138.297	159.276	183.601	211.801	244.487	282.362	326.237
24	102.174	118.155	136.831	158.659	184.168	213.978	248.808	289.494	337.010	392.484
25	114.413	133.334	155.620	181.871	212.793	249.214	292.105	342.603	402.042	471.981

Present Value Interest Factor under Continuous Compounding

x	e^-x
0.001	0.9990
0.002	0.9980
0.003	0.9970
0.004	0.9960
0.005	0.9950
0.006	0.9940
0.007	0.9930
0.008	0.9920
0.009	0.9910
0.010	0.9900
0.011	0.9891
0.012	0.9881
0.013	0.9871
0.014	0.9861
0.015	0.9851
0.016	0.9841
0.017	0.9831
0.018	0.9822
0.019	0.9812
0.020	0.9802
0.021	0.9792
0.022	0.9782
0.023	0.9773
0.024	0.9763
0.025	0.9753
0.026	0.9743
0.027	0.9734
0.028	0.9724
0.029	0.9714
0.030	0.9704
0.031	0.9695
0.032	0.9685
0.033	0.9675
0.034	0.9666
0.035	0.9656
0.036	0.9646
0.037	0.9637
0.038	0.9627
0.039	0.9618
0.040	0.9608
0.041	0.9598
0.042	0.9589
0.043	0.9579
0.044	0.9570
0.045	0.9560
0.046	0.9550
0.047	0.9541
0.048	0.9531
0.049	0.9522
0.050	0.9512

x	e^-x
0.051	0.9503
0.052	0.9493
0.053	0.9484
0.054	0.9474
0.055	0.9465
0.056	0.9455
0.057	0.9446
0.058	0.9436
0.059	0.9427
0.060	0.9418
0.061	0.9408
0.062	0.9399
0.063	0.9389
0.064	0.9380
0.065	0.9371
0.066	0.9361
0.067	0.9352
0.068	0.9343
0.069	0.9333
0.070	0.9324
0.071	0.9315
0.072	0.9305
0.073	0.9296
0.074	0.9287
0.075	0.9277
0.076	0.9268
0.077	0.9259
0.078	0.9250
0.079	0.9240
0.080	0.9231
0.081	0.9222
0.082	0.9213
0.083	0.9204
0.084	0.9194
0.085	0.9185
0.086	0.9176
0.087	0.9167
0.088	0.9158
0.089	0.9148
0.090	0.9139
0.091	0.9130
0.092	0.9121
0.093	0.9112
0.094	0.9103
0.095	0.9094
0.096	0.9085
0.097	0.9076
0.098	0.9066
0.099	0.9057
0.100	0.9048

x	e^-x
0.101	0.9039
0.102	0.9030
0.103	0.9021
0.104	0.9012
0.105	0.9003
0.106	0.8994
0.107	0.8985
0.108	0.8976
0.109	0.8967
0.110	0.8958
0.111	0.8949
0.112	0.8940
0.113	0.8932
0.114	0.8923
0.115	0.8914
0.116	0.8905
0.117	0.8896
0.118	0.8887
0.119	0.8878
0.120	0.8869
0.121	0.8860
0.122	0.8851
0.123	0.8843
0.124	0.8834
0.125	0.8825
0.126	0.8816
0.127	0.8807
0.128	0.8799
0.129	0.8790
0.130	0.8781
0.131	0.8772
0.132	0.8763
0.133	0.8755
0.134	0.8746
0.135	0.8737
0.136	0.8728
0.137	0.8720
0.138	0.8711
0.139	0.8702
0.140	0.8694
0.141	0.8685
0.142	0.8676
0.143	0.8668
0.144	0.8659
0.145	0.8650
0.146	0.8642
0.147	0.8633
0.148	0.8624
0.149	0.8616
0.150	0.8607

x	e^-x
0.151	0.8598
0.152	0.8590
0.153	0.8581
0.154	0.8573
0.155	0.8564
0.156	0.8556
0.157	0.8547
0.158	0.8538
0.159	0.8530
0.160	0.8521
0.161	0.8513
0.162	0.8504
0.163	0.8496
0.164	0.8487
0.165	0.8479
0.166	0.8470
0.167	0.8462
0.168	0.8454
0.169	0.8445
0.170	0.8437
0.171	0.8428
0.172	0.8420
0.173	0.8411
0.174	0.8403
0.175	0.8395
0.176	0.8386
0.177	0.8378
0.178	0.8369
0.179	0.8361
0.180	0.8353
0.181	0.8344
0.182	0.8336
0.183	0.8328
0.184	0.8319
0.185	0.8311
0.186	0.8303
0.187	0.8294
0.188	0.8286
0.189	0.8278
0.190	0.8270
0.191	0.8261
0.192	0.8253
0.193	0.8245
0.194	0.8237
0.195	0.8228
0.196	0.8220
0.197	0.8212
0.198	0.8204
0.199	0.8195
0.200	0.8187

x	e^-x
0.201	0.8179
0.202	0.8171
0.203	0.8163
0.204	0.8155
0.205	0.8146
0.206	0.8138
0.207	0.8130
0.208	0.8122
0.209	0.8114
0.210	0.8106
0.211	0.8098
0.212	0.8090
0.213	0.8082
0.214	0.8073
0.215	0.8065
0.216	0.8057
0.217	0.8049
0.218	0.8041
0.219	0.8033
0.220	0.8025
0.221	0.8017
0.222	0.8009
0.223	0.8001
0.224	0.7993
0.225	0.7985
0.226	0.7977
0.227	0.7969
0.228	0.7961
0.229	0.7953
0.230	0.7945
0.231	0.7937
0.232	0.7929
0.233	0.7922
0.234	0.7914
0.235	0.7906
0.236	0.7898
0.237	0.7890
0.238	0.7882
0.239	0.7874
0.240	0.7866
0.241	0.7858
0.242	0.7851
0.243	0.7843
0.244	0.7835
0.245	0.7827
0.246	0.7819
0.247	0.7811
0.248	0.7804
0.249	0.7796
0.250	0.7788

x	e^-x
0.251	0.7780
0.252	0.7772
0.253	0.7765
0.254	0.7757
0.255	0.7749
0.256	0.7741
0.257	0.7734
0.258	0.7726
0.259	0.7718
0.260	0.7711
0.261	0.7703
0.262	0.7695
0.263	0.7687
0.264	0.7680
0.265	0.7672
0.266	0.7664
0.267	0.7657
0.268	0.7649
0.269	0.7641
0.270	0.7634
0.271	0.7626
0.272	0.7619
0.273	0.7611
0.274	0.7603
0.275	0.7596
0.276	0.7588
0.277	0.7581
0.278	0.7573
0.279	0.7565
0.280	0.7558
0.281	0.7550
0.282	0.7543
0.283	0.7535
0.284	0.7528
0.285	0.7520
0.286	0.7513
0.287	0.7505
0.288	0.7498
0.289	0.7490
0.290	0.7483
0.291	0.7475
0.292	0.7468
0.293	0.7460
0.294	0.7453
0.295	0.7445
0.296	0.7438
0.297	0.7430
0.298	0.7423
0.299	0.7416
0.300	0.7408

x	e^-x
0.301	0.7401
0.302	0.7393
0.303	0.7386
0.304	0.7379
0.305	0.7371
0.306	0.7364
0.307	0.7357
0.308	0.7349
0.309	0.7342
0.310	0.7334
0.311	0.7327
0.312	0.7320
0.313	0.7312
0.314	0.7305
0.315	0.7298
0.316	0.7291
0.317	0.7283
0.318	0.7276
0.319	0.7269
0.320	0.7261
0.321	0.7254
0.322	0.7247
0.323	0.7240
0.324	0.7233
0.325	0.7225
0.326	0.7218
0.327	0.7211
0.328	0.7204
0.329	0.7196
0.330	0.7189
0.331	0.7182
0.332	0.7175
0.333	0.7168
0.334	0.7161
0.335	0.7153
0.336	0.7146
0.337	0.7139
0.338	0.7132
0.339	0.7125
0.340	0.7118
0.341	0.7111
0.342	0.7103
0.343	0.7096
0.344	0.7089
0.345	0.7082
0.346	0.7075
0.347	0.7068
0.348	0.7061
0.349	0.7054
0.350	0.7047

Present Value Interest Factor under Continuous Compounding

x	e^-x
0.351	0.7040
0.352	0.7033
0.353	0.7026
0.354	0.7019
0.355	0.7012
0.356	0.7005
0.357	0.6998
0.358	0.6991
0.359	0.6984
0.360	0.6977
0.361	0.6970
0.362	0.6963
0.363	0.6956
0.364	0.6949
0.365	0.6942
0.366	0.6935
0.367	0.6928
0.368	0.6921
0.369	0.6914
0.370	0.6907
0.371	0.6900
0.372	0.6894
0.373	0.6887
0.374	0.6880
0.375	0.6873
0.376	0.6866
0.377	0.6859
0.378	0.6852
0.379	0.6845
0.380	0.6839
0.381	0.6832
0.382	0.6825
0.383	0.6818
0.384	0.6811
0.385	0.6805
0.386	0.6798
0.387	0.6791
0.388	0.6784
0.389	0.6777
0.390	0.6771
0.391	0.6764
0.392	0.6757
0.393	0.6750
0.394	0.6744
0.395	0.6737
0.396	0.6730
0.397	0.6723
0.398	0.6717
0.399	0.6710
0.400	0.6703

x	e^-x
0.401	0.6697
0.402	0.6690
0.403	0.6683
0.404	0.6676
0.405	0.6670
0.406	0.6663
0.407	0.6656
0.408	0.6650
0.409	0.6643
0.410	0.6637
0.411	0.6630
0.412	0.6623
0.413	0.6617
0.414	0.6610
0.415	0.6603
0.416	0.6597
0.417	0.6590
0.418	0.6584
0.419	0.6577
0.420	0.6570
0.421	0.6564
0.422	0.6557
0.423	0.6551
0.424	0.6544
0.425	0.6538
0.426	0.6531
0.427	0.6525
0.428	0.6518
0.429	0.6512
0.430	0.6505
0.431	0.6499
0.432	0.6492
0.433	0.6486
0.434	0.6479
0.435	0.6473
0.436	0.6466
0.437	0.6460
0.438	0.6453
0.439	0.6447
0.440	0.6440
0.441	0.6434
0.442	0.6427
0.443	0.6421
0.444	0.6415
0.445	0.6408
0.446	0.6402
0.447	0.6395
0.448	0.6389
0.449	0.6383
0.450	0.6376

x	e^-x
0.451	0.6370
0.452	0.6364
0.453	0.6357
0.454	0.6351
0.455	0.6344
0.456	0.6338
0.457	0.6332
0.458	0.6325
0.459	0.6319
0.460	0.6313
0.461	0.6307
0.462	0.6300
0.463	0.6294
0.464	0.6288
0.465	0.6281
0.466	0.6275
0.467	0.6269
0.468	0.6263
0.469	0.6256
0.470	0.6250
0.471	0.6244
0.472	0.6238
0.473	0.6231
0.474	0.6225
0.475	0.6219
0.476	0.6213
0.477	0.6206
0.478	0.6200
0.479	0.6194
0.480	0.6188
0.481	0.6182
0.482	0.6175
0.483	0.6169
0.484	0.6163
0.485	0.6157
0.486	0.6151
0.487	0.6145
0.488	0.6139
0.489	0.6132
0.490	0.6126
0.491	0.6120
0.492	0.6114
0.493	0.6108
0.494	0.6102
0.495	0.6096
0.496	0.6090
0.497	0.6084
0.498	0.6077
0.499	0.6071
0.500	0.6065

x	e^-x
0.501	0.6059
0.502	0.6053
0.503	0.6047
0.504	0.6041
0.505	0.6035
0.506	0.6029
0.507	0.6023
0.508	0.6017
0.509	0.6011
0.510	0.6005
0.511	0.5999
0.512	0.5993
0.513	0.5987
0.514	0.5981
0.515	0.5975
0.516	0.5969
0.517	0.5963
0.518	0.5957
0.519	0.5951
0.520	0.5945
0.521	0.5939
0.522	0.5933
0.523	0.5927
0.524	0.5921
0.525	0.5916
0.526	0.5910
0.527	0.5904
0.528	0.5898
0.529	0.5892
0.530	0.5886
0.531	0.5880
0.532	0.5874
0.533	0.5868
0.534	0.5863
0.535	0.5857
0.536	0.5851
0.537	0.5845
0.538	0.5839
0.539	0.5833
0.540	0.5827
0.541	0.5822
0.542	0.5816
0.543	0.5810
0.544	0.5804
0.545	0.5798
0.546	0.5793
0.547	0.5787
0.548	0.5781
0.549	0.5775
0.550	0.5769

x	e^-x
0.551	0.5764
0.552	0.5758
0.553	0.5752
0.554	0.5746
0.555	0.5741
0.556	0.5735
0.557	0.5729
0.558	0.5724
0.559	0.5718
0.560	0.5712
0.561	0.5706
0.562	0.5701
0.563	0.5695
0.564	0.5689
0.565	0.5684
0.566	0.5678
0.567	0.5672
0.568	0.5667
0.569	0.5661
0.570	0.5655
0.571	0.5650
0.572	0.5644
0.573	0.5638
0.574	0.5633
0.575	0.5627
0.576	0.5621
0.577	0.5616
0.578	0.5610
0.579	0.5605
0.580	0.5599
0.581	0.5593
0.582	0.5588
0.583	0.5582
0.584	0.5577
0.585	0.5571
0.586	0.5565
0.587	0.5560
0.588	0.5554
0.589	0.5549
0.590	0.5543
0.591	0.5538
0.592	0.5532
0.593	0.5527
0.594	0.5521
0.595	0.5516
0.596	0.5510
0.597	0.5505
0.598	0.5499
0.599	0.5494
0.600	0.5488

x	e^-x
0.601	0.5483
0.602	0.5477
0.603	0.5472
0.604	0.5466
0.605	0.5461
0.606	0.5455
0.607	0.5450
0.608	0.5444
0.609	0.5439
0.610	0.5434
0.611	0.5428
0.612	0.5423
0.613	0.5417
0.614	0.5412
0.615	0.5406
0.616	0.5401
0.617	0.5396
0.618	0.5390
0.619	0.5385
0.620	0.5379
0.621	0.5374
0.622	0.5369
0.623	0.5363
0.624	0.5358
0.625	0.5353
0.626	0.5347
0.627	0.5342
0.628	0.5337
0.629	0.5331
0.630	0.5326
0.631	0.5321
0.632	0.5315
0.633	0.5310
0.634	0.5305
0.635	0.5299
0.636	0.5294
0.637	0.5289
0.638	0.5283
0.639	0.5278
0.640	0.5273
0.641	0.5268
0.642	0.5262
0.643	0.5257
0.644	0.5252
0.645	0.5247
0.646	0.5241
0.647	0.5236
0.648	0.5231
0.649	0.5226
0.650	0.5220

Present Value Interest Factor under Continuous Compounding

x	e^-x
0.651	0.5215
0.652	0.5210
0.653	0.5205
0.654	0.5200
0.655	0.5194
0.656	0.5189
0.657	0.5184
0.658	0.5179
0.659	0.5174
0.660	0.5169
0.661	0.5163
0.662	0.5158
0.663	0.5153
0.664	0.5148
0.665	0.5143
0.666	0.5138
0.667	0.5132
0.668	0.5127
0.669	0.5122
0.670	0.5117
0.671	0.5112
0.672	0.5107
0.673	0.5102
0.674	0.5097
0.675	0.5092
0.676	0.5086
0.677	0.5081
0.678	0.5076
0.679	0.5071
0.680	0.5066
0.681	0.5061
0.682	0.5056
0.683	0.5051
0.684	0.5046
0.685	0.5041
0.686	0.5036
0.687	0.5031
0.688	0.5026
0.689	0.5021
0.690	0.5016
0.691	0.5011
0.692	0.5006
0.693	0.5001
0.694	0.4996
0.695	0.4991
0.696	0.4986
0.697	0.4981
0.698	0.4976
0.699	0.4971
0.700	0.4966

x	e^-x
0.701	0.4961
0.702	0.4956
0.703	0.4951
0.704	0.4946
0.705	0.4941
0.706	0.4936
0.707	0.4931
0.708	0.4926
0.709	0.4921
0.710	0.4916
0.711	0.4912
0.712	0.4907
0.713	0.4902
0.714	0.4897
0.715	0.4892
0.716	0.4887
0.717	0.4882
0.718	0.4877
0.719	0.4872
0.720	0.4868
0.721	0.4863
0.722	0.4858
0.723	0.4853
0.724	0.4848
0.725	0.4843
0.726	0.4838
0.727	0.4834
0.728	0.4829
0.729	0.4824
0.730	0.4819
0.731	0.4814
0.732	0.4809
0.733	0.4805
0.734	0.4800
0.735	0.4795
0.736	0.4790
0.737	0.4785
0.738	0.4781
0.739	0.4776
0.740	0.4771
0.741	0.4766
0.742	0.4762
0.743	0.4757
0.744	0.4752
0.745	0.4747
0.746	0.4743
0.747	0.4738
0.748	0.4733
0.749	0.4728
0.750	0.4724

x	e^-x
0.751	0.4719
0.752	0.4714
0.753	0.4710
0.754	0.4705
0.755	0.4700
0.756	0.4695
0.757	0.4691
0.758	0.4686
0.759	0.4681
0.760	0.4677
0.761	0.4672
0.762	0.4667
0.763	0.4663
0.764	0.4658
0.765	0.4653
0.766	0.4649
0.767	0.4644
0.768	0.4639
0.769	0.4635
0.770	0.4630
0.771	0.4626
0.772	0.4621
0.773	0.4616
0.774	0.4612
0.775	0.4607
0.776	0.4602
0.777	0.4598
0.778	0.4593
0.779	0.4589
0.780	0.4584
0.781	0.4579
0.782	0.4575
0.783	0.4570
0.784	0.4566
0.785	0.4561
0.786	0.4557
0.787	0.4552
0.788	0.4548
0.789	0.4543
0.790	0.4538
0.791	0.4534
0.792	0.4529
0.793	0.4525
0.794	0.4520
0.795	0.4516
0.796	0.4511
0.797	0.4507
0.798	0.4502
0.799	0.4498
0.800	0.4493

x	e^-x
0.801	0.4489
0.802	0.4484
0.803	0.4480
0.804	0.4475
0.805	0.4471
0.806	0.4466
0.807	0.4462
0.808	0.4457
0.809	0.4453
0.810	0.4449
0.811	0.4444
0.812	0.4440
0.813	0.4435
0.814	0.4431
0.815	0.4426
0.816	0.4422
0.817	0.4418
0.818	0.4413
0.819	0.4409
0.820	0.4404
0.821	0.4400
0.822	0.4396
0.823	0.4391
0.824	0.4387
0.825	0.4382
0.826	0.4378
0.827	0.4374
0.828	0.4369
0.829	0.4365
0.830	0.4360
0.831	0.4356
0.832	0.4352
0.833	0.4347
0.834	0.4343
0.835	0.4339
0.836	0.4334
0.837	0.4330
0.838	0.4326
0.839	0.4321
0.840	0.4317
0.841	0.4313
0.842	0.4308
0.843	0.4304
0.844	0.4300
0.845	0.4296
0.846	0.4291
0.847	0.4287
0.848	0.4283
0.849	0.4278
0.850	0.4274

x	e^-x
0.851	0.4270
0.852	0.4266
0.853	0.4261
0.854	0.4257
0.855	0.4253
0.856	0.4249
0.857	0.4244
0.858	0.4240
0.859	0.4236
0.860	0.4232
0.861	0.4227
0.862	0.4223
0.863	0.4219
0.864	0.4215
0.865	0.4211
0.866	0.4206
0.867	0.4202
0.868	0.4198
0.869	0.4194
0.870	0.4190
0.871	0.4185
0.872	0.4181
0.873	0.4177
0.874	0.4173
0.875	0.4169
0.876	0.4164
0.877	0.4160
0.878	0.4156
0.879	0.4152
0.880	0.4148
0.881	0.4144
0.882	0.4140
0.883	0.4135
0.884	0.4131
0.885	0.4127
0.886	0.4123
0.887	0.4119
0.888	0.4115
0.889	0.4111
0.890	0.4107
0.891	0.4102
0.892	0.4098
0.893	0.4094
0.894	0.4090
0.895	0.4086
0.896	0.4082
0.897	0.4078
0.898	0.4074
0.899	0.4070
0.900	0.4066

x	e^-x
0.901	0.4062
0.902	0.4058
0.903	0.4054
0.904	0.4049
0.905	0.4045
0.906	0.4041
0.907	0.4037
0.908	0.4033
0.909	0.4029
0.910	0.4025
0.911	0.4021
0.912	0.4017
0.913	0.4013
0.914	0.4009
0.915	0.4005
0.916	0.4001
0.917	0.3997
0.918	0.3993
0.919	0.3989
0.920	0.3985
0.921	0.3981
0.922	0.3977
0.923	0.3973
0.924	0.3969
0.925	0.3965
0.926	0.3961
0.927	0.3957
0.928	0.3953
0.929	0.3949
0.930	0.3946
0.931	0.3942
0.932	0.3938
0.933	0.3934
0.934	0.3930
0.935	0.3926
0.936	0.3922
0.937	0.3918
0.938	0.3914
0.939	0.3910
0.940	0.3906
0.941	0.3902
0.942	0.3898
0.943	0.3895
0.944	0.3891
0.945	0.3887
0.946	0.3883
0.947	0.3879
0.948	0.3875
0.949	0.3871
0.950	0.3867

x	e^-x
0.951	0.3864
0.952	0.3860
0.953	0.3856
0.954	0.3852
0.955	0.3848
0.956	0.3844
0.957	0.3840
0.958	0.3837
0.959	0.3833
0.960	0.3829
0.961	0.3825
0.962	0.3821
0.963	0.3817
0.964	0.3814
0.965	0.3810
0.966	0.3806
0.967	0.3802
0.968	0.3798
0.969	0.3795
0.970	0.3791
0.971	0.3787
0.972	0.3783
0.973	0.3779
0.974	0.3776
0.975	0.3772
0.976	0.3768
0.977	0.3764
0.978	0.3761
0.979	0.3757
0.980	0.3753
0.981	0.3749
0.982	0.3746
0.983	0.3742
0.984	0.3738
0.985	0.3734
0.986	0.3731
0.987	0.3727
0.988	0.3723
0.989	0.3719
0.990	0.3716
0.991	0.3712
0.992	0.3708
0.993	0.3705
0.994	0.3701
0.995	0.3697
0.996	0.3694
0.997	0.3690
0.998	0.3686
0.999	0.3682
1.000	0.3679

Future Value Interest Factor under Continuous Compounding

x	e^x
0.001	1.0010
0.002	1.0020
0.003	1.0030
0.004	1.0040
0.005	1.0050
0.006	1.0060
0.007	1.0070
0.008	1.0080
0.009	1.0090
0.010	1.0101
0.011	1.0111
0.012	1.0121
0.013	1.0131
0.014	1.0141
0.015	1.0151
0.016	1.0161
0.017	1.0171
0.018	1.0182
0.019	1.0192
0.020	1.0202
0.021	1.0212
0.022	1.0222
0.023	1.0233
0.024	1.0243
0.025	1.0253
0.026	1.0263
0.027	1.0274
0.028	1.0284
0.029	1.0294
0.030	1.0305
0.031	1.0315
0.032	1.0325
0.033	1.0336
0.034	1.0346
0.035	1.0356
0.036	1.0367
0.037	1.0377
0.038	1.0387
0.039	1.0398
0.040	1.0408
0.041	1.0419
0.042	1.0429
0.043	1.0439
0.044	1.0450
0.045	1.0460
0.046	1.0471
0.047	1.0481
0.048	1.0492
0.049	1.0502
0.050	1.0513

x	e^x
0.051	1.0523
0.052	1.0534
0.053	1.0544
0.054	1.0555
0.055	1.0565
0.056	1.0576
0.057	1.0587
0.058	1.0597
0.059	1.0608
0.060	1.0618
0.061	1.0629
0.062	1.0640
0.063	1.0650
0.064	1.0661
0.065	1.0672
0.066	1.0682
0.067	1.0693
0.068	1.0704
0.069	1.0714
0.070	1.0725
0.071	1.0736
0.072	1.0747
0.073	1.0757
0.074	1.0768
0.075	1.0779
0.076	1.0790
0.077	1.0800
0.078	1.0811
0.079	1.0822
0.080	1.0833
0.081	1.0844
0.082	1.0855
0.083	1.0865
0.084	1.0876
0.085	1.0887
0.086	1.0898
0.087	1.0909
0.088	1.0920
0.089	1.0931
0.090	1.0942
0.091	1.0953
0.092	1.0964
0.093	1.0975
0.094	1.0986
0.095	1.0997
0.096	1.1008
0.097	1.1019
0.098	1.1030
0.099	1.1041
0.100	1.1052

x	e^x
0.101	1.1063
0.102	1.1074
0.103	1.1085
0.104	1.1096
0.105	1.1107
0.106	1.1118
0.107	1.1129
0.108	1.1140
0.109	1.1152
0.110	1.1163
0.111	1.1174
0.112	1.1185
0.113	1.1196
0.114	1.1208
0.115	1.1219
0.116	1.1230
0.117	1.1241
0.118	1.1252
0.119	1.1264
0.120	1.1275
0.121	1.1286
0.122	1.1298
0.123	1.1309
0.124	1.1320
0.125	1.1331
0.126	1.1343
0.127	1.1354
0.128	1.1366
0.129	1.1377
0.130	1.1388
0.131	1.1400
0.132	1.1411
0.133	1.1422
0.134	1.1434
0.135	1.1445
0.136	1.1457
0.137	1.1468
0.138	1.1480
0.139	1.1491
0.140	1.1503
0.141	1.1514
0.142	1.1526
0.143	1.1537
0.144	1.1549
0.145	1.1560
0.146	1.1572
0.147	1.1584
0.148	1.1595
0.149	1.1607
0.150	1.1618

x	e^x
0.151	1.1630
0.152	1.1642
0.153	1.1653
0.154	1.1665
0.155	1.1677
0.156	1.1688
0.157	1.1700
0.158	1.1712
0.159	1.1723
0.160	1.1735
0.161	1.1747
0.162	1.1759
0.163	1.1770
0.164	1.1782
0.165	1.1794
0.166	1.1806
0.167	1.1818
0.168	1.1829
0.169	1.1841
0.170	1.1853
0.171	1.1865
0.172	1.1877
0.173	1.1889
0.174	1.1901
0.175	1.1912
0.176	1.1924
0.177	1.1936
0.178	1.1948
0.179	1.1960
0.180	1.1972
0.181	1.1984
0.182	1.1996
0.183	1.2008
0.184	1.2020
0.185	1.2032
0.186	1.2044
0.187	1.2056
0.188	1.2068
0.189	1.2080
0.190	1.2092
0.191	1.2105
0.192	1.2117
0.193	1.2129
0.194	1.2141
0.195	1.2153
0.196	1.2165
0.197	1.2177
0.198	1.2190
0.199	1.2202
0.200	1.2214

x	e^x
0.201	1.2226
0.202	1.2238
0.203	1.2251
0.204	1.2263
0.205	1.2275
0.206	1.2288
0.207	1.2300
0.208	1.2312
0.209	1.2324
0.210	1.2337
0.211	1.2349
0.212	1.2361
0.213	1.2374
0.214	1.2386
0.215	1.2399
0.216	1.2411
0.217	1.2423
0.218	1.2436
0.219	1.2448
0.220	1.2461
0.221	1.2473
0.222	1.2486
0.223	1.2498
0.224	1.2511
0.225	1.2523
0.226	1.2536
0.227	1.2548
0.228	1.2561
0.229	1.2573
0.230	1.2586
0.231	1.2599
0.232	1.2611
0.233	1.2624
0.234	1.2636
0.235	1.2649
0.236	1.2662
0.237	1.2674
0.238	1.2687
0.239	1.2700
0.240	1.2712
0.241	1.2725
0.242	1.2738
0.243	1.2751
0.244	1.2763
0.245	1.2776
0.246	1.2789
0.247	1.2802
0.248	1.2815
0.249	1.2827
0.250	1.2840

x	e^x
0.251	1.2853
0.252	1.2866
0.253	1.2879
0.254	1.2892
0.255	1.2905
0.256	1.2918
0.257	1.2930
0.258	1.2943
0.259	1.2956
0.260	1.2969
0.261	1.2982
0.262	1.2995
0.263	1.3008
0.264	1.3021
0.265	1.3034
0.266	1.3047
0.267	1.3060
0.268	1.3073
0.269	1.3087
0.270	1.3100
0.271	1.3113
0.272	1.3126
0.273	1.3139
0.274	1.3152
0.275	1.3165
0.276	1.3178
0.277	1.3192
0.278	1.3205
0.279	1.3218
0.280	1.3231
0.281	1.3245
0.282	1.3258
0.283	1.3271
0.284	1.3284
0.285	1.3298
0.286	1.3311
0.287	1.3324
0.288	1.3338
0.289	1.3351
0.290	1.3364
0.291	1.3378
0.292	1.3391
0.293	1.3404
0.294	1.3418
0.295	1.3431
0.296	1.3445
0.297	1.3458
0.298	1.3472
0.299	1.3485
0.300	1.3499

x	e^x
0.301	1.3512
0.302	1.3526
0.303	1.3539
0.304	1.3553
0.305	1.3566
0.306	1.3580
0.307	1.3593
0.308	1.3607
0.309	1.3621
0.310	1.3634
0.311	1.3648
0.312	1.3662
0.313	1.3675
0.314	1.3689
0.315	1.3703
0.316	1.3716
0.317	1.3730
0.318	1.3744
0.319	1.3758
0.320	1.3771
0.321	1.3785
0.322	1.3799
0.323	1.3813
0.324	1.3826
0.325	1.3840
0.326	1.3854
0.327	1.3868
0.328	1.3882
0.329	1.3896
0.330	1.3910
0.331	1.3924
0.332	1.3938
0.333	1.3951
0.334	1.3965
0.335	1.3979
0.336	1.3993
0.337	1.4007
0.338	1.4021
0.339	1.4035
0.340	1.4049
0.341	1.4064
0.342	1.4078
0.343	1.4092
0.344	1.4106
0.345	1.4120
0.346	1.4134
0.347	1.4148
0.348	1.4162
0.349	1.4176
0.350	1.4191

Future Value Interest Factor under Continuous Compounding

x	e^x
0.351	1.4205
0.352	1.4219
0.353	1.4233
0.354	1.4248
0.355	1.4262
0.356	1.4276
0.357	1.4290
0.358	1.4305
0.359	1.4319
0.360	1.4333
0.361	1.4348
0.362	1.4362
0.363	1.4376
0.364	1.4391
0.365	1.4405
0.366	1.4420
0.367	1.4434
0.368	1.4448
0.369	1.4463
0.370	1.4477
0.371	1.4492
0.372	1.4506
0.373	1.4521
0.374	1.4535
0.375	1.4550
0.376	1.4564
0.377	1.4579
0.378	1.4594
0.379	1.4608
0.380	1.4623
0.381	1.4637
0.382	1.4652
0.383	1.4667
0.384	1.4681
0.385	1.4696
0.386	1.4711
0.387	1.4726
0.388	1.4740
0.389	1.4755
0.390	1.4770
0.391	1.4785
0.392	1.4799
0.393	1.4814
0.394	1.4829
0.395	1.4844
0.396	1.4859
0.397	1.4874
0.398	1.4888
0.399	1.4903
0.400	1.4918

x	e^x
0.401	1.4933
0.402	1.4948
0.403	1.4963
0.404	1.4978
0.405	1.4993
0.406	1.5008
0.407	1.5023
0.408	1.5038
0.409	1.5053
0.410	1.5068
0.411	1.5083
0.412	1.5098
0.413	1.5113
0.414	1.5129
0.415	1.5144
0.416	1.5159
0.417	1.5174
0.418	1.5189
0.419	1.5204
0.420	1.5220
0.421	1.5235
0.422	1.5250
0.423	1.5265
0.424	1.5281
0.425	1.5296
0.426	1.5311
0.427	1.5327
0.428	1.5342
0.429	1.5357
0.430	1.5373
0.431	1.5388
0.432	1.5403
0.433	1.5419
0.434	1.5434
0.435	1.5450
0.436	1.5465
0.437	1.5481
0.438	1.5496
0.439	1.5512
0.440	1.5527
0.441	1.5543
0.442	1.5558
0.443	1.5574
0.444	1.5589
0.445	1.5605
0.446	1.5621
0.447	1.5636
0.448	1.5652
0.449	1.5667
0.450	1.5683

x	e^x
0.451	1.5699
0.452	1.5715
0.453	1.5730
0.454	1.5746
0.455	1.5762
0.456	1.5778
0.457	1.5793
0.458	1.5809
0.459	1.5825
0.460	1.5841
0.461	1.5857
0.462	1.5872
0.463	1.5888
0.464	1.5904
0.465	1.5920
0.466	1.5936
0.467	1.5952
0.468	1.5968
0.469	1.5984
0.470	1.6000
0.471	1.6016
0.472	1.6032
0.473	1.6048
0.474	1.6064
0.475	1.6080
0.476	1.6096
0.477	1.6112
0.478	1.6128
0.479	1.6145
0.480	1.6161
0.481	1.6177
0.482	1.6193
0.483	1.6209
0.484	1.6226
0.485	1.6242
0.486	1.6258
0.487	1.6274
0.488	1.6291
0.489	1.6307
0.490	1.6323
0.491	1.6339
0.492	1.6356
0.493	1.6372
0.494	1.6389
0.495	1.6405
0.496	1.6421
0.497	1.6438
0.498	1.6454
0.499	1.6471
0.500	1.6487

x	e^x
0.501	1.6504
0.502	1.6520
0.503	1.6537
0.504	1.6553
0.505	1.6570
0.506	1.6586
0.507	1.6603
0.508	1.6620
0.509	1.6636
0.510	1.6653
0.511	1.6670
0.512	1.6686
0.513	1.6703
0.514	1.6720
0.515	1.6736
0.516	1.6753
0.517	1.6770
0.518	1.6787
0.519	1.6803
0.520	1.6820
0.521	1.6837
0.522	1.6854
0.523	1.6871
0.524	1.6888
0.525	1.6905
0.526	1.6922
0.527	1.6938
0.528	1.6955
0.529	1.6972
0.530	1.6989
0.531	1.7006
0.532	1.7023
0.533	1.7040
0.534	1.7057
0.535	1.7074
0.536	1.7092
0.537	1.7109
0.538	1.7126
0.539	1.7143
0.540	1.7160
0.541	1.7177
0.542	1.7194
0.543	1.7212
0.544	1.7229
0.545	1.7246
0.546	1.7263
0.547	1.7281
0.548	1.7298
0.549	1.7315
0.550	1.7333

x	e^x
0.551	1.7350
0.552	1.7367
0.553	1.7385
0.554	1.7402
0.555	1.7419
0.556	1.7437
0.557	1.7454
0.558	1.7472
0.559	1.7489
0.560	1.7507
0.561	1.7524
0.562	1.7542
0.563	1.7559
0.564	1.7577
0.565	1.7594
0.566	1.7612
0.567	1.7630
0.568	1.7647
0.569	1.7665
0.570	1.7683
0.571	1.7700
0.572	1.7718
0.573	1.7736
0.574	1.7754
0.575	1.7771
0.576	1.7789
0.577	1.7807
0.578	1.7825
0.579	1.7843
0.580	1.7860
0.581	1.7878
0.582	1.7896
0.583	1.7914
0.584	1.7932
0.585	1.7950
0.586	1.7968
0.587	1.7986
0.588	1.8004
0.589	1.8022
0.590	1.8040
0.591	1.8058
0.592	1.8076
0.593	1.8094
0.594	1.8112
0.595	1.8130
0.596	1.8148
0.597	1.8167
0.598	1.8185
0.599	1.8203
0.600	1.8221

x	e^x
0.601	1.8239
0.602	1.8258
0.603	1.8276
0.604	1.8294
0.605	1.8313
0.606	1.8331
0.607	1.8349
0.608	1.8368
0.609	1.8386
0.610	1.8404
0.611	1.8423
0.612	1.8441
0.613	1.8460
0.614	1.8478
0.615	1.8497
0.616	1.8515
0.617	1.8534
0.618	1.8552
0.619	1.8571
0.620	1.8589
0.621	1.8608
0.622	1.8626
0.623	1.8645
0.624	1.8664
0.625	1.8682
0.626	1.8701
0.627	1.8720
0.628	1.8739
0.629	1.8757
0.630	1.8776
0.631	1.8795
0.632	1.8814
0.633	1.8833
0.634	1.8851
0.635	1.8870
0.636	1.8889
0.637	1.8908
0.638	1.8927
0.639	1.8946
0.640	1.8965
0.641	1.8984
0.642	1.9003
0.643	1.9022
0.644	1.9041
0.645	1.9060
0.646	1.9079
0.647	1.9098
0.648	1.9117
0.649	1.9136
0.650	1.9155

Future Value Interest Factor under Continuous Compounding

x	e^x
0.651	1.9175
0.652	1.9194
0.653	1.9213
0.654	1.9232
0.655	1.9251
0.656	1.9271
0.657	1.9290
0.658	1.9309
0.659	1.9329
0.660	1.9348
0.661	1.9367
0.662	1.9387
0.663	1.9406
0.664	1.9425
0.665	1.9445
0.666	1.9464
0.667	1.9484
0.668	1.9503
0.669	1.9523
0.670	1.9542
0.671	1.9562
0.672	1.9581
0.673	1.9601
0.674	1.9621
0.675	1.9640
0.676	1.9660
0.677	1.9680
0.678	1.9699
0.679	1.9719
0.680	1.9739
0.681	1.9759
0.682	1.9778
0.683	1.9798
0.684	1.9818
0.685	1.9838
0.686	1.9858
0.687	1.9877
0.688	1.9897
0.689	1.9917
0.690	1.9937
0.691	1.9957
0.692	1.9977
0.693	1.9997
0.694	2.0017
0.695	2.0037
0.696	2.0057
0.697	2.0077
0.698	2.0097
0.699	2.0117
0.700	2.0138

x	e^x
0.701	2.0158
0.702	2.0178
0.703	2.0198
0.704	2.0218
0.705	2.0238
0.706	2.0259
0.707	2.0279
0.708	2.0299
0.709	2.0320
0.710	2.0340
0.711	2.0360
0.712	2.0381
0.713	2.0401
0.714	2.0421
0.715	2.0442
0.716	2.0462
0.717	2.0483
0.718	2.0503
0.719	2.0524
0.720	2.0544
0.721	2.0565
0.722	2.0585
0.723	2.0606
0.724	2.0627
0.725	2.0647
0.726	2.0668
0.727	2.0689
0.728	2.0709
0.729	2.0730
0.730	2.0751
0.731	2.0772
0.732	2.0792
0.733	2.0813
0.734	2.0834
0.735	2.0855
0.736	2.0876
0.737	2.0897
0.738	2.0917
0.739	2.0938
0.740	2.0959
0.741	2.0980
0.742	2.1001
0.743	2.1022
0.744	2.1043
0.745	2.1064
0.746	2.1085
0.747	2.1107
0.748	2.1128
0.749	2.1149
0.750	2.1170

x	e^x
0.751	2.1191
0.752	2.1212
0.753	2.1234
0.754	2.1255
0.755	2.1276
0.756	2.1297
0.757	2.1319
0.758	2.1340
0.759	2.1361
0.760	2.1383
0.761	2.1404
0.762	2.1426
0.763	2.1447
0.764	2.1468
0.765	2.1490
0.766	2.1511
0.767	2.1533
0.768	2.1555
0.769	2.1576
0.770	2.1598
0.771	2.1619
0.772	2.1641
0.773	2.1663
0.774	2.1684
0.775	2.1706
0.776	2.1728
0.777	2.1749
0.778	2.1771
0.779	2.1793
0.780	2.1815
0.781	2.1837
0.782	2.1858
0.783	2.1880
0.784	2.1902
0.785	2.1924
0.786	2.1946
0.787	2.1968
0.788	2.1990
0.789	2.2012
0.790	2.2034
0.791	2.2056
0.792	2.2078
0.793	2.2100
0.794	2.2122
0.795	2.2144
0.796	2.2167
0.797	2.2189
0.798	2.2211
0.799	2.2233
0.800	2.2255

x	e^x
0.801	2.2278
0.802	2.2300
0.803	2.2322
0.804	2.2345
0.805	2.2367
0.806	2.2389
0.807	2.2412
0.808	2.2434
0.809	2.2457
0.810	2.2479
0.811	2.2502
0.812	2.2524
0.813	2.2547
0.814	2.2569
0.815	2.2592
0.816	2.2614
0.817	2.2637
0.818	2.2660
0.819	2.2682
0.820	2.2705
0.821	2.2728
0.822	2.2750
0.823	2.2773
0.824	2.2796
0.825	2.2819
0.826	2.2842
0.827	2.2864
0.828	2.2887
0.829	2.2910
0.830	2.2933
0.831	2.2956
0.832	2.2979
0.833	2.3002
0.834	2.3025
0.835	2.3048
0.836	2.3071
0.837	2.3094
0.838	2.3117
0.839	2.3141
0.840	2.3164
0.841	2.3187
0.842	2.3210
0.843	2.3233
0.844	2.3257
0.845	2.3280
0.846	2.3303
0.847	2.3326
0.848	2.3350
0.849	2.3373
0.850	2.3396

x	e^x
0.851	2.3420
0.852	2.3443
0.853	2.3467
0.854	2.3490
0.855	2.3514
0.856	2.3537
0.857	2.3561
0.858	2.3584
0.859	2.3608
0.860	2.3632
0.861	2.3655
0.862	2.3679
0.863	2.3703
0.864	2.3726
0.865	2.3750
0.866	2.3774
0.867	2.3798
0.868	2.3821
0.869	2.3845
0.870	2.3869
0.871	2.3893
0.872	2.3917
0.873	2.3941
0.874	2.3965
0.875	2.3989
0.876	2.4013
0.877	2.4037
0.878	2.4061
0.879	2.4085
0.880	2.4109
0.881	2.4133
0.882	2.4157
0.883	2.4181
0.884	2.4206
0.885	2.4230
0.886	2.4254
0.887	2.4278
0.888	2.4303
0.889	2.4327
0.890	2.4351
0.891	2.4376
0.892	2.4400
0.893	2.4424
0.894	2.4449
0.895	2.4473
0.896	2.4498
0.897	2.4522
0.898	2.4547
0.899	2.4571
0.900	2.4596

x	e^x
0.901	2.4621
0.902	2.4645
0.903	2.4670
0.904	2.4695
0.905	2.4719
0.906	2.4744
0.907	2.4769
0.908	2.4794
0.909	2.4818
0.910	2.4843
0.911	2.4868
0.912	2.4893
0.913	2.4918
0.914	2.4943
0.915	2.4968
0.916	2.4993
0.917	2.5018
0.918	2.5043
0.919	2.5068
0.920	2.5093
0.921	2.5118
0.922	2.5143
0.923	2.5168
0.924	2.5193
0.925	2.5219
0.926	2.5244
0.927	2.5269
0.928	2.5294
0.929	2.5320
0.930	2.5345
0.931	2.5370
0.932	2.5396
0.933	2.5421
0.934	2.5447
0.935	2.5472
0.936	2.5498
0.937	2.5523
0.938	2.5549
0.939	2.5574
0.940	2.5600
0.941	2.5625
0.942	2.5651
0.943	2.5677
0.944	2.5702
0.945	2.5728
0.946	2.5754
0.947	2.5780
0.948	2.5805
0.949	2.5831
0.950	2.5857

x	e^x
0.951	2.5883
0.952	2.5909
0.953	2.5935
0.954	2.5961
0.955	2.5987
0.956	2.6013
0.957	2.6039
0.958	2.6065
0.959	2.6091
0.960	2.6117
0.961	2.6143
0.962	2.6169
0.963	2.6195
0.964	2.6222
0.965	2.6248
0.966	2.6274
0.967	2.6300
0.968	2.6327
0.969	2.6353
0.970	2.6379
0.971	2.6406
0.972	2.6432
0.973	2.6459
0.974	2.6485
0.975	2.6512
0.976	2.6538
0.977	2.6565
0.978	2.6591
0.979	2.6618
0.980	2.6645
0.981	2.6671
0.982	2.6698
0.983	2.6725
0.984	2.6751
0.985	2.6778
0.986	2.6805
0.987	2.6832
0.988	2.6859
0.989	2.6885
0.990	2.6912
0.991	2.6939
0.992	2.6966
0.993	2.6993
0.994	2.7020
0.995	2.7047
0.996	2.7074
0.997	2.7101
0.998	2.7129
0.999	2.7156
1.000	2.7183

Natural Logarithms

x	Ln(x)
0.01	-4.6052
0.02	-3.9120
0.03	-3.5066
0.04	-3.2189
0.05	-2.9957
0.06	-2.8134
0.07	-2.6593
0.08	-2.5257
0.09	-2.4079
0.10	-2.3026
0.11	-2.2073
0.12	-2.1203
0.13	-2.0402
0.14	-1.9661
0.15	-1.8971
0.16	-1.8326
0.17	-1.7720
0.18	-1.7148
0.19	-1.6607
0.20	-1.6094
0.21	-1.5606
0.22	-1.5141
0.23	-1.4697
0.24	-1.4271
0.25	-1.3863
0.26	-1.3471
0.27	-1.3093
0.28	-1.2730
0.29	-1.2379
0.30	-1.2040
0.31	-1.1712
0.32	-1.1394
0.33	-1.1087
0.34	-1.0788
0.35	-1.0498
0.36	-1.0217
0.37	-0.9943
0.38	-0.9676
0.39	-0.9416
0.40	-0.9163
0.41	-0.8916
0.42	-0.8675
0.43	-0.8440
0.44	-0.8210
0.45	-0.7985
0.46	-0.7765
0.47	-0.7550
0.48	-0.7340
0.49	-0.7133
0.50	-0.6931

x	Ln(x)
0.51	-0.6733
0.52	-0.6539
0.53	-0.6349
0.54	-0.6162
0.55	-0.5978
0.56	-0.5798
0.57	-0.5621
0.58	-0.5447
0.59	-0.5276
0.60	-0.5108
0.61	-0.4943
0.62	-0.4780
0.63	-0.4620
0.64	-0.4463
0.65	-0.4308
0.66	-0.4155
0.67	-0.4005
0.68	-0.3857
0.69	-0.3711
0.70	-0.3567
0.71	-0.3425
0.72	-0.3285
0.73	-0.3147
0.74	-0.3011
0.75	-0.2877
0.76	-0.2744
0.77	-0.2614
0.78	-0.2485
0.79	-0.2357
0.80	-0.2231
0.81	-0.2107
0.82	-0.1985
0.83	-0.1863
0.84	-0.1744
0.85	-0.1625
0.86	-0.1508
0.87	-0.1393
0.88	-0.1278
0.89	-0.1165
0.90	-0.1054
0.91	-0.0943
0.92	-0.0834
0.93	-0.0726
0.94	-0.0619
0.95	-0.0513
0.96	-0.0408
0.97	-0.0305
0.98	-0.0202
0.99	-0.0101
1.00	0.0000

x	Ln(x)
1.01	0.0100
1.02	0.0198
1.03	0.0296
1.04	0.0392
1.05	0.0488
1.06	0.0583
1.07	0.0677
1.08	0.0770
1.09	0.0862
1.10	0.0953
1.11	0.1044
1.12	0.1133
1.13	0.1222
1.14	0.1310
1.15	0.1398
1.16	0.1484
1.17	0.1570
1.18	0.1655
1.19	0.1740
1.20	0.1823
1.21	0.1906
1.22	0.1989
1.23	0.2070
1.24	0.2151
1.25	0.2231
1.26	0.2311
1.27	0.2390
1.28	0.2469
1.29	0.2546
1.30	0.2624
1.31	0.2700
1.32	0.2776
1.33	0.2852
1.34	0.2927
1.35	0.3001
1.36	0.3075
1.37	0.3148
1.38	0.3221
1.39	0.3293
1.40	0.3365
1.41	0.3436
1.42	0.3507
1.43	0.3577
1.44	0.3646
1.45	0.3716
1.46	0.3784
1.47	0.3853
1.48	0.3920
1.49	0.3988
1.50	0.4055

x	Ln(x)
1.51	0.4121
1.52	0.4187
1.53	0.4253
1.54	0.4318
1.55	0.4383
1.56	0.4447
1.57	0.4511
1.58	0.4574
1.59	0.4637
1.60	0.4700
1.61	0.4762
1.62	0.4824
1.63	0.4886
1.64	0.4947
1.65	0.5008
1.66	0.5068
1.67	0.5128
1.68	0.5188
1.69	0.5247
1.70	0.5306
1.71	0.5365
1.72	0.5423
1.73	0.5481
1.74	0.5539
1.75	0.5596
1.76	0.5653
1.77	0.5710
1.78	0.5766
1.79	0.5822
1.80	0.5878
1.81	0.5933
1.82	0.5988
1.83	0.6043
1.84	0.6098
1.85	0.6152
1.86	0.6206
1.87	0.6259
1.88	0.6313
1.89	0.6366
1.90	0.6419
1.91	0.6471
1.92	0.6523
1.93	0.6575
1.94	0.6627
1.95	0.6678
1.96	0.6729
1.97	0.6780
1.98	0.6831
1.99	0.6881
2.00	0.6931

x	Ln(x)
2.10	0.7419
2.20	0.7885
2.30	0.8329
2.40	0.8755
2.50	0.9163
2.60	0.9555
2.70	0.9933
2.80	1.0296
2.90	1.0647
3.00	1.0986
3.10	1.1314
3.20	1.1632
3.30	1.1939
3.40	1.2238
3.50	1.2528
3.60	1.2809
3.70	1.3083
3.80	1.3350
3.90	1.3610
4.00	1.3863
4.10	1.4110
4.20	1.4351
4.30	1.4586
4.40	1.4816
4.50	1.5041
4.60	1.5261
4.70	1.5476
4.80	1.5686
4.90	1.5892
5.00	1.6094
5.50	1.7047
6.00	1.7918
6.50	1.8718
7.00	1.9459
7.50	2.0149
8.00	2.0794
8.50	2.1401
9.00	2.1972
9.50	2.2513
10.00	2.3026
11.00	2.3979
12.00	2.4849
13.00	2.5649
14.00	2.6391
15.00	2.7081
16.00	2.7726
17.00	2.8332
18.00	2.8904
19.00	2.9444
20.00	2.9957

Area under the Normal Curve

Z Value	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990
3.1	0.4990	0.4991	0.4991	0.4991	0.4992	0.4992	0.4992	0.4992	0.4993	0.4993
3.2	0.4993	0.4993	0.4994	0.4994	0.4994	0.4994	0.4994	0.4995	0.4995	0.4995
3.3	0.4995	0.4995	0.4995	0.4996	0.4996	0.4996	0.4996	0.4996	0.4996	0.4997
3.4	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4998
3.5	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998
3.6	0.4998	0.4998	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.7	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.8	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.9	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000
4.0	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000

Note: For computation, use 0.50 ± Above Values, depending upon whether Z is positive or negative.

Fast Track Referencer

Ratios, Proportions, Indices & Logarithms

A. Proportions

1. Equality of two ratios is called a proportion. If the terms a,b,c,d are in proportion, then a:b = c:d, or ad = bc.
2. **Mean Proportional of three terms:** If a,b,c are in continued proportion then, $\frac{a}{b} = \frac{b}{c}$. Therefore, $b^2 = ac$.

$b = \sqrt{ab} \Rightarrow b = \sqrt{ac}$. Hence b is itself the Mean Proportional between a and c.

Result	Property
1. b : a = d : c	Invertendo
2. a : c = b : d	Alternendo
3. (a + b) : b = (c + d) : d	Componendo
4. (a – b) : b = (c – d) : d	Dividendo
5. (a + b) : (a – b) = (c + d) : (c – d)	Componendo and Dividendo
6. a:b = c:d = (a+c) : (b+d)	Addendo
7. a:b = c:d = (a–c) : (b–d)	Subtrahendo

B. Indices

1. $a^m \times a^n = a^{m+n}$	4. $(ab)^m = a^m b^m$	7. $a^x = a^y \Rightarrow x = y$
2. $\frac{a^m}{a^n} = a^{m-n}$	5. $a^0 = 1$	8. $x^a = y^a \Rightarrow x = y$
3. $(a^m)^n = a^{mn} = (a^n)^m$	6. $a^{-m} = \frac{1}{a^m}$	9. $\sqrt[m]{a} = a^{\frac{1}{m}}$

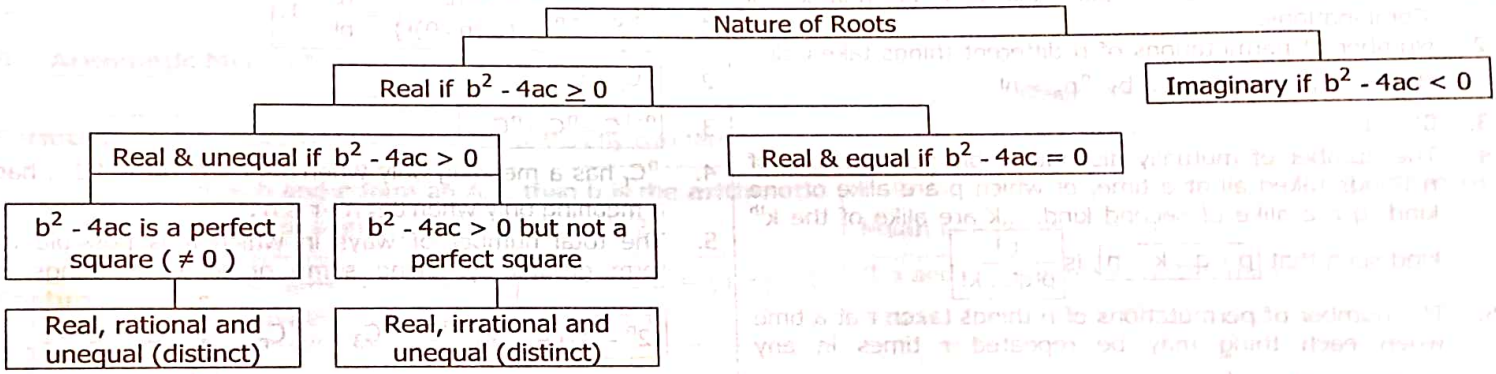
C. Logarithms:

1. If $a^x = n$, then $\log_a n = x$	5. $\log_a m^n = n \log_a m$	9. $\log_b a = \frac{1}{\log_a b}$
2. $\log_a a = 1$	6. $\log_a m = \log_b m \times \log_a b$	10. $a^{\log_a x} = x$
3. $\log_a mn = \log_a m + \log_a n$	7. $\log_a 1 = 0$	11. $\log 10 = 1$
4. $\log_a\left(\frac{m}{n}\right) = \log_a m - \log_a n$	8. $\log_b a \times \log_a b = 1$	

Note: Log using base 10 is called Common Logarithm. Log using base e is called Natural Logarithm. [e = Exponent ≅ 2.33]

Equations

1. Roots of the quadratic equation shall be identified by: $\alpha = \frac{-b + \sqrt{b^2 - 4ac}}{2a}$; $\beta = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$
2. Discriminant = $b^2 - 4ac$. It is called as Discriminant, since it discriminates between the roots, α, β.



1. Irrational roots occur in pairs, i.e. if $(m + \sqrt{n})$ is a root then $(m - \sqrt{n})$ is the other root of the same equation.
2. If one root is reciprocal to the other root then their product is 1 and so $\frac{c}{a} = 1$, i.e. $c = a$
3. If one root is equal to other root but opposite in sign then, their sum = 0 and so $\frac{b}{a} = 0$, i.e. $b = 0$.

Time Value of Money

A. Simple Interest & Compound Interest

	Simple Interest	Compound Interest
Interest	$P \times N \times R$	$P(1+R)^n - P = P[(1+R)^n - 1]$
Amount	$A = P[1 + (N \times R)]$	$A = P(1 + I/K)^{NK}$
Principal	$P = A \div [1 + (N \times R)]$	$P = A \div (1 + I/K)^{NK}$

Effective Interest Rate = $\frac{\text{Actual Interest Paid During the Year}}{\text{Opening Principal of the Year}} = \frac{\text{Closing Amount} - \text{Opening Principal}}{\text{Opening Principal of the Year}} = E = \left(1 + \frac{i}{k}\right)^k$

B. Annuity

	Annuity Regular (Year end)	Annuity Immediate (Year beginning)
Present Value (PV)	$PV = CF\left[\frac{(1+i)^n - 1}{i(1+i)^n}\right]$	$PV = CF\left[\frac{(1+i)^n - 1}{i(1+i)^n}\right] \times (1 + i)$
Future Value (FV)	$A = CF\left[\frac{(1+i)^n - 1}{i}\right]$	$A = CF\left[\frac{(1+i)^n - 1}{i}\right] \times (1 + i)$
PV using Factors	PV = CF × PVAF @ r% for n periods	PV = CF × [PVAF @ r% for (n–1) periods +
FV using Factors	FV = CF × [FVAF @ r% for (n–1) periods + 1]	FV = CF × FVAF @ r% for n periods

C. Perpetuity

PV of a **Constant** Perpetuity = $\frac{C}{R}$

Where **C** = Cash Flow, i.e. Interest, Dividend, etc. per period.
R = Interest Rate per payment period.

PV of a **Growing** Perpetuity = $\frac{C}{R - G}$

Where **C** = Cash Flow, i.e. Interest, Dividend, etc. for the first period
R = Interest Rate per payment period.
G = Rate of growth in Cash Flows.

Permutations & Combinations

Permutations

1. The number of Permutations exceeds the number of Combinations.
2. Number of permutations of n different things taken all n things at a time is given by ${}^nP_n = n!$
3. $0! = 1$.
4. The number of mutually distinguishable permutations of n things taken all at a time, of which p are alike of one kind, q are alike of second kind, ...k are alike of the k^{th} kind such that $p + q....k = n$, is $\frac{n!}{p!q!....k!}$
5. The number of permutations of n things taken r at a time when each thing may be repeated r times in any arrangement is n^r.

Combinations

1. ${}^nC_0 = {}^nC_n = \frac{n!}{\{0!(n-0)!\}} = \frac{n!}{n!} = 1.$
2. ${}^nC_r = {}^nC_{n-r}$
3. ${}^{n+1}C_r = {}^nC_r + {}^nC_{r-1}$
4. ${}^nC_r$ has a meaning only when $0 \le r \le n$. Also ${}^nC_{n-r}$ has a meaning only when $0 \le n - r \le n$.
5. The total number of ways in which it is possible to form groups by taking some or all of n things is $(2^n - 1)$ i.e. ${}^nC_1 + {}^nC_2 + {}^nC_3 + ... {}^nC_n = \sum_{r=1}^{n} {}^nC_r = 2^n - 1$.

6. Total number of Circular Permutations = (n–1)!
7. Circular Permutations such that a person shall not have the same neighbor in any two arrangements = $\frac{1}{2}(n-1)!$
8. $\boxed{{}^nP_r = n \cdot {}^{n-1}P_{r-1}}$
9. $\boxed{{}^nP_r = (n-r+1) \times {}^nP_{r-1}}$
10. $\boxed{{}^n p_r = {}^{n-1} p_r + r \cdot {}^{n-1}p_{r-1}}$ **[Note]**

6. The total number of ways in which it is possible to make groups by taking some or all out of n= $(n_1+n_2+n_3+\ldots)$ things, where n_1, n_2, n_3 are things each alike of one kind, is given by $\{(n_1+1)(n_2+1)(n_3+1)\ldots\}-1$.
7. ${}^nC_r$ and ${}^nC_{n-r}$ are called complementary combinations, for if we form a group of r things out of n different things, (n–r) remaining things which are not included in this group form another group of rejected things.

Note: $\boxed{{}^{n-1} p_r}$ is the No. of Permutations of n distinct objects when a particular object is not taken in any arrangement, and $\boxed{r \cdot {}^{n-1}p_{r-1}}$ is the No. of permutations of n distinct objects when a particular object is always included in any arrangement.

Arithmetic & Geometric Progression (AP & GP)

A. Arithmetic Progressions (AP) vs. Geometric Progression (GP)

	Arithmetic Progressions (AP)	Geometric Progression (GP)
3 Parts	$a-d, a, a+d$	$a/r, a, ar$
nth term	$t_n = a+(n-1)d$ Where 'a' is the first term 'd' is the common difference	$t_n = a\,r^{n-1}$ Where 'a' is the first term 'r' is the common ratio
Sum (S_n) of n terms	$S_n = \frac{n}{2}\{2a+(n-1)d\}$ or $S_n = \frac{n}{2}\{a+l\}$ Where l is the last term $= a+(n-1)d$	$S_n = a(\frac{r^n-1}{r-1})$ if $r>1$ or $S_n = \frac{lr-a}{r-1}$ $S_n = a(\frac{1-r^n}{1-r})$, if $r<1$ or $S_n = \frac{a-lr}{1-r}$ l = Last term
Infinite Progression	Refer Table Below **[Note]**	$S_\infty = \frac{a}{1-r}$, for $r<1$

Note:

Situation	Formulae
1. Sum of 1st n Natural Numbers	$\sum_{n=1}^{n} n = 1+2+3+\ldots+n = \frac{n(n+1)}{2}$
2. Sum of 1st n Odd Numbers	$1+3+5+\ldots..+(2n-1) = n^2$
3. Sum of the squares of 1st n Natural Numbers	$\sum_{n=1}^{n} n^2 = 1^2+2^2+3^2+\ldots+n^2 = \frac{n(n+1)(2n+1)}{6}$
4. Sum of the cubes of 1st n Natural Numbers	$\sum_{n=1}^{n} n^3 = 1^3+2^3+3^3+\ldots+n^3 = [\frac{n(n+1)}{2}]^2$

B. Arithmetic Mean (AM) vs Geometric Mean (GM)

	Arithmetic Mean (AM)	Geometric Mean (GM)
Formula	A = (a+b)/2, where a and b are any two terms.	$G = \sqrt{ab}$, where a and b are any two terms.
Meaning	If a, b and c form an A.P. then b is the **arithmetic mean** of a and c, where b = (a+c) /2.	If a, b, c are in G.P., then b is the **Geometric Mean** of a and c, then $\boxed{b^2 = ac}$ or $\boxed{b = \sqrt{ac}}$.
Features	If the terms a and c are in A.P. and b = (a+c) / 2, then the terms a, b, c also form an A.P.	If a and c are terms of a G.P. then terms a, b, c are also in GP where b = GM of a and c = $\sqrt{ac}$