
UNIVERSITI SAINS MALAYSIA

Second Semester Examination
2014/2015 Academic Session

June 2015

CIT573 – Financial Planning & Management
[Perancangan dan Pengurusan Kewangan]

Duration : 2 hours
[Masa : 2 jam]

INSTRUCTIONS TO CANDIDATE:

[ARAHAN KEPADA CALON:]

- Please ensure that this examination paper contains **THREE** questions and **ONE** Appendix in **SEVENTEEN** printed pages before you begin the examination

*[Sila pastikan bahawa kertas peperiksaan ini mengandungi **TIGA** soalan dan **SATU** Lampiran di dalam **TUJUH BELAS** muka surat yang bercetak sebelum anda memulakan peperiksaan ini.]*

- Answer **ALL** questions.

*[Jawab **SEMUA** soalan.]*

- You may answer the questions either in English or in Bahasa Malaysia.

[Anda dibenarkan menjawab soalan sama ada dalam bahasa Inggeris atau bahasa Malaysia.]

- This is an 'Open Book' Examination.

[Peperiksaan ini akan dijalankan secara 'Open Book'.]

- In the event of any discrepancies, the English version shall be used.

[Sekiranya terdapat sebarang percanggahan pada soalan peperiksaan, versi bahasa Inggeris hendaklah diguna pakai.]

1. In 2015, Core International rocketed to RM300,000,000 in sales after 10 years in business. The company's fashion line caters the needs of young women from head to toe with hats, sweaters, dresses, blouses, skirts, pants, socks and shoes. The company's historical growth was spectacular that no one could have predicted it. However, securities analysts speculated that Core could not keep up the pace. They warned that competition is fierce in the fashion industry and that the firm might encounter little or no growth in the future. They estimated that stockholders also should expect no growth in future dividends. Core's CEO believed that the company could maintain a constant annual growth rate in dividends per share of 6% in the future, or possibly 8% for the next 2 years and 6% thereafter. The CEO based his estimates on an established long-term expansion plan into European and US markets. Venturing into these markets was expected to cause the risk of the firm, as measured by the risk premium on its stock, to increase immediately from 8.8% to 10%. Currently, the risk-free rate is 6%.

In preparing the long-term financial plan, Core's CFO has assigned a junior financial analyst to evaluate the company's current stock price. He has asked the financial analyst to consider the conservative predictions of the securities analysts and the aggressive predictions of the CEO. The financial analyst has compiled the following 2015 financial data to aid his analysis:

Data item	2015 value
Earnings per share (EPS)	RM 6.25
Price per share of common stock	RM 40.00
Book value of common stock equity	RM 60,000,000
Total common shares outstanding	2,500,000
Common stock dividend per share	RM 4.00

- (a) What is the firm's current book value per share?
(5/100)
- (b) Calculate the firm's current P/E ratio.
(5/100)
- (c) (i) What is the current required return for Core stock?
(ii) What will be the new required return for Core stocks assuming that the firm expands into European and US markets as planned?
(10/100)
2. First Food Manufacturing expects stable sales through the months of April, May and June of RM500,000 per month. The firm will make purchases of RM350,000 per month during these months. Wages and salaries are estimated at RM60,000 per month plus 7 percent of sales. The firm must make a principal and interest payment on an outstanding loan in April of RM100,000. The firm plans a purchase of a fixed asset costing RM75,000 in May. The second quarter tax payment of RM20,000 is also due in April. All sales are for cash.

- (a) Construct a cash budget for April, May, and June, assuming the firm has a beginning cash balance of RM100,000 in April.

(20/100)

- (b) The sales projections may not be accurate due to the lack of experience by a newly-hired sales manager. If the sales manager believes the most optimistic and pessimistic estimates of sales are RM600,000 and RM400,000, respectively, what are the monthly net cash flows, and required financing or excess cash balances (whichever one is applicable)? Please, advise the firm of what action should it take for the whole three months, if the most pessimistic sales figure materializes. Also please advise the firm what actions to take, if the most optimistic estimate materializes.

(10/100)

3. ABC Sdn Bhd is a small & medium enterprise (SME) listed in the second board of the Kuala Lumpur Stock Exchange (KLSE). It is involved with instant noodle production for its international market. The management is thinking of replacing the old machine with a new one for its noodle production so as to ensure that production meets global demand. The machine currently in use was originally purchased 2 years ago for RM50,000. The machine is being depreciated under the modified accelerated cost recovery system (MACRS) using a 5-year recovery period; it has 3 years of usable life remaining. The current machine can be sold today to net RM52,000 after removal and clean-up costs. A new machine, using a 3-year MACRS recovery period, can be purchased at a price of RM200,000. It requires RM15,000 to install and has a 3-year usable life. The MACRS for four property classes is given in Table 1.

Table 1: Rounded Depreciation Percentages by Recovery Year Using MACRS for Four Property Classes

Recovery year	Percentage by recovery year			
	3 years	5 years	7 years	10 years
1	33%	20%	14%	10%
2	45	32	25	18
3	15	19	18	14
4	7	12	12	12
5		12	9	9
6		5	9	8
7			9	7
8			4	6
9				6
10				6
11				4
Totals	100%	100%	100%	100%

If the new machine is acquired, the investment in accounts receivable will be expected to rise by RM15,000, the inventory investment will increase by RM30,000, and accounts payable will increase by RM10,000. Earnings before depreciation, interest, and taxes are expected to be RM80,000 for each of the next 3 years with the old machine and to be RM150,000 in the first year and RM120,000 in the second and third years with the new machine. At the end of 3 years, the market value of the old machine will equal zero, but the new machine could be sold to net RM50,000 before taxes. The firm is subject to a 40% tax rate.

- (a) Determine the initial investment associated with the proposed replacement decision.

(12/100)

- (b) Calculate the incremental operating cash inflows for years 1 to 4 associated with the proposed replacement. (Note: Only depreciation cash flows must be considered in year 4).

(15/100)

- (c) Calculate the terminal cash flow associated with the proposed replacement decision. (**Note:** This is at the end of year 3).

(12/100)

- (d) Depict on a time line the relevant cash flows found in parts 3(a), 3(b), and 3(c) that are associated with the proposed replacement decision, assuming that it is terminated at the end of year 3.

(3/100)

- (e) Is the incremental cash flow for the fourth year relevant to the proposal? Why (please justify your answer)?

(4/100)

- (f) The company wishes to seek your advice as to whether it should go ahead with the proposal. Based on your calculations, will ABC Sdn Bhd be better off or worse off, if it chooses to implement the proposal? Why (please justify your answer)?

(4/100)

KERTAS SOALAN DALAM VERSI BAHASA MALAYSIA

[CIT573]

- 5 -

1. Pada tahun 2015, Syarikat Core International telah memperoleh kutipan jualan sebanyak RM300,000,000 selepas 10 tahun berada dalam perniagaan. Syarikat ini menjual pelbagai pakaian fesyen wanita termasuk topi, baju panas, gaun wanita, blaus, skirt, seluar, sarung kaki dan kasut. Faktor pertumbuhan syarikat yang menakjubkan sememangnya tidak dapat diramalkan oleh sesiapaupun. Walau bagaimanapun, penganalisis-penganalisis sekuriti telah membuat spekulasi bahawa Syarikat Core International tidak akan mampu bersaing untuk masa yang lama. Mereka telah memberi amaran bahawa persaingan adalah sengit dalam industri fesyen dan syarikat tersebut mungkin tidak akan memperoleh sebarang atau sedikit pertumbuhan pada masa hadapan. Mereka juga menganggarkan bahawa pemegang saham patut bersedia untuk tidak menerima sebarang pertumbuhan dividen pada masa hadapan. Ketua Pegawai Eksekutif, Syarikat Core International percaya bahawa syarikat tersebut mampu mengekalkan pertumbuhan tahunan tetap dalam dividen untuk setiap saham sebanyak 6% pada masa hadapan, atau kemungkinan 8% untuk 2 tahun berikutnya dan 6% selepas itu. Anggaran daripada Ketua Pegawai Eksekutif tersebut berasaskan kepada pelan pengembangan jangka panjang untuk masuk ke pasaran Eropah dan Amerika Syarikat. Kemasukan ke dalam pasaran tersebut dijangka akan membawa risiko kepada syarikat di mana tahap risiko akan naik daripada 8.8% kepada 10%, berasaskan kepada anggaran risiko premium ke atas saham syarikat. Pada masa sekarang, kadar risiko bebas ialah sebanyak 6%.

Di dalam penyediaan pelan kewangan jangka panjang, Ketua Pegawai Kewangan Syarikat Core International telah menugaskan seorang penganalisa kewangan berpangkat rendah untuk menilai harga saham semasa syarikat. Dia telah meminta penganalisa kewangan tersebut untuk memikirkan ramalan konservatif para penganalisis sekuriti dan juga ramalan agresif daripada Ketua Pegawai Eksekutif. Penganalisa kewangan tersebut telah menyusun maklumat kewangan 2015 bagi membantu analisisnya:

Butiran maklumat	Nilai 2015
Perolehan untuk setiap saham (EPS)	RM 6.25
Harga untuk setiap saham biasa	RM 40.00
Nilai buku untuk ekuiti saham biasa	RM 60,000,000
Jumlah saham biasa yang belum dijelaskan	2,500,000
Dividen untuk saham biasa	RM 4.00

- (a) Apakah nilai buku semasa untuk setiap saham biasa dalam syarikat tersebut?
(5/100)
- (b) Sila hitung nisbah P/E semasa untuk syarikat tersebut.
(5/100)
- (c) (i) Apakah nilai hasil pulangan semasa untuk saham syarikat Core?
(ii) Apakah nilai hasil pulangan semasa yang terbaru untuk saham syarikat Core seandainya syarikat tersebut berkembang ke dalam pasaran Eropah dan Amerika Syarikat seperti yang telah dirancangkan?
(10/100)

2. Syarikat Pembuatan First Food menjangka jualan stabil bagi April, Mei dan Jun sebanyak RM500,000 sebulan. Syarikat akan membuat belian sebanyak RM350,000 sebulan bagi bulan-bulan ini. Gaji dan upahan dianggarkan RM60,000 sebulan campur 7 peratus jualan. Syarikat mesti membayar bunga dan pokok bagi pinjaman perlu dibayar pada April sebanyak RM100,000. Syarikat bercadang untuk membeli asset tetap dengan harga kos RM75,000 pada bulan Mei. Pada suku kedua pembayaran cukai, RM20,000 juga perlu dibayar pada April. Kesemua jualan dalam tunai.

(a) Bina belanjawan tunai bagi April, Mei, dan Jun, dengan andaian bahawa syarikat mempunyai baki tunai permulaan sebanyak RM100,000 dalam bulan April.

(20/100)

(b) Unjuran jualan mungkin tidak tepat kerana pengurus jualan baru sahaja dilantik dan kurang berpengalaman. Sekiranya pengurus jualan tersebut percaya anggaran jualan yang paling optimistik dan pesimistik adalah RM600,000 dan RM400,000 masing-masing, apakah aliran tunai bersih bulanan dan pembiayaan yang diperlukan atau baki lebihan tunai (yang mana berkaitan)? Sila nasihatkan syarikat tersebut, apa tindakan yang perlu diambil bagi ketiga-tiga bulan, sekiranya angka jualan paling pesimistik dipilih? Juga, sila nasihatkan syarikat tersebut apa tindakan yang perlu diambil, sekiranya anggaran optimistik dipilih?

(10/100)

3. ABC Sdn Bhd adalah satu perusahaan kecil dan sederhana yang telah disenaraikan dalam papan kedua Bursa Saham Kuala Lumpur. Ianya terlibat dalam pengeluaran mee segera untuk pasaran antarabangsa. Pihak pengurusan sedang dalam perancangan untuk menggantikan mesin lama dengan sebuah mesin baru bagi pengeluaran mee bagi memastikan pengeluaran memenuhi permintaan dunia. Mesin yang sedang digunakan sekarang telah dibeli 2 tahun yang lepas dengan harga RM50,000. Mesin tersebut disusut nilai dengan menggunakan tempoh pemulihan 5 tahun di bawah sistem pemulihan kos pantas diubahsuai (MACRS); dan ianya mempunyai baki 3 tahun hayat penggunaan. Mesin yang sedia ada boleh dijual pada masa sekarang dengan nilai bersih RM52,000 selepas mengambil kira kos pembuangan dan pembersihan. Mesin baru menggunakan tempoh pemulihan MACRS 3 tahun, boleh diperolehi dengan harga belian RM200,000. Ianya memerlukan RM15,000 untuk dipasang dan ianya mempunyai 3 tahun hayat berguna. MACRS untuk empat kelas harta diberi dalam Jadual 1.

Jadual 1: Peratusan Susut nilai Dibundarkan mengikut Tahun Pemulihan Menggunakan MACRS untuk Empat Kelas Harta

Tahun pemulihan	Peratusan mengikut tahun pemulihan			
	3 tahun	5 tahun	7 tahun	10 tahun
1	33%	20%	14%	10%
2	45	32	25	18
3	15	19	18	14
4	7	12	12	12
5		12	9	9
6		5	9	8
7			9	7
8			4	6
9				6
10				6
11				4
Jumlah	100%	100%	100%	100%

Sekiranya mesin baru diperolehi, pelaburan dalam akaun-akaun terimaan dijangka akan bertambah sebanyak RM15,000, pelaburan inventori akan bertambah sebanyak RM30,000, dan akaun-akaun kena bayar akan bertambah sebanyak RM10,000. Perolehan sebelum susut nilai, faedah, dan cukai dijangka akan menjadi RM80,000 untuk setiap tahun bagi 3 tahun yang akan datang dengan mesin lama dan RM150,000 bagi tahun pertama dan RM120,000 bagi tahun kedua dan ketiga untuk mesin baru. Di akhir tiga tahun, nilai pasaran bagi mesin lama adalah sifar, tetapi mesin baru boleh dijual pada harga RM50,000 bersih sebelum cukai. Syarikat dikenakan kadar cukai 40%.

- (a) Kirakan pelaburan permulaan berkaitan dengan keputusan cadangan penggantian.

(12/100)

- (b) Kirakan tambahan tunai masuk operasi bagi tahun-tahun 1 hingga 4 bersangkutan dengan cadangan penggantian. (**Nota:** Hanya aliran tunai susut nilai mesti diambil kira dalam tahun 4).

(15/100)

- (c) Kirakan aliran tunai akhir yang berkaitan dengan keputusan cadangan penggantian. (**Nota:** Ini adalah di akhir tahun 3).

(12/100)

- (d) Tunjukkan di atas garisan masa aliran-aliran tunai berkaitan yang terdapat dalam bahagian (a), (b), dan (c) yang bersangkutan dengan keputusan cadangan penggantian, dengan andaian bahawa ianya akan ditamatkan pada akhir tahun 3.

(3/100)

- (e) Adakah tambahan aliran tunai bagi tahun keempat relevan bagi cadangan ini? Kenapa (sila beri alasan kepada jawapan anda)?

(4/100)

- (f) Syarikat ini ingin mendapat nasihat anda sama ada ia patut teruskan dengan cadangan ini atau pun tidak. Berdasarkan kepada kiraan-kiraan anda, adakah bagus atau pun tidak bagi ABC Sdn Bhd sekiranya ia teruskan dengan cadangan ini? Kenapa (sila beri alasan kepada jawapan anda)?

(4/100)

Appendix A

Financial Tables

TABLE A-1 Future Value Interest Factors for One Dollar Compounded at r Percent for n Periods:

$$FVIF_{r,n} = (1 + r)^n$$

TABLE A-2 Present Value Interest Factors for One Dollar Discounted at r Percent for n Periods:

$$PVIF_{r,n} = \frac{1}{(1 + r)^n}$$

TABLE A-3 Future Value Interest Factors for a One-Dollar Ordinary Annuity Compounded at r Percent for n Periods:

$$FVIFA_{r,n} = \sum_{t=1}^n (1 + r)^{t-1}$$

TABLE A-4 Present Value Interest Factors for a One-Dollar Annuity Discounted at r Percent for n Periods:

$$PVIFA_{r,n} = \sum_{t=1}^n \frac{1}{(1 + r)^t}$$

TABLE A-1 Future Value Interest Factors for One Dollar Compounded at r Percent for n Periods: $FVIF_{r,n} = (1 + r)^n$

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%	21%
1	1.010	1.020	1.030	1.040	1.050	1.060	1.070	1.080	1.090	1.100	1.110	1.120	1.130	1.140	1.150	1.160	1.170	1.180	1.190	1.200	1.210
2	1.020	1.040	1.061	1.082	1.102	1.124	1.145	1.166	1.188	1.210	1.232	1.254	1.277	1.300	1.322	1.346	1.369	1.392	1.416	1.440	1.464
3	1.030	1.061	1.093	1.125	1.158	1.191	1.225	1.260	1.295	1.331	1.368	1.405	1.443	1.482	1.521	1.561	1.602	1.643	1.685	1.728	1.772
4	1.041	1.082	1.126	1.170	1.216	1.262	1.311	1.360	1.412	1.464	1.518	1.574	1.630	1.689	1.749	1.811	1.874	1.939	2.005	2.074	2.144
5	1.051	1.104	1.159	1.217	1.276	1.338	1.403	1.469	1.539	1.611	1.685	1.762	1.842	1.925	2.011	2.100	2.192	2.288	2.386	2.488	2.594
6	1.062	1.126	1.194	1.265	1.340	1.419	1.501	1.587	1.677	1.772	1.870	1.974	2.082	2.195	2.313	2.436	2.565	2.700	2.840	2.986	3.138
7	1.072	1.149	1.230	1.316	1.407	1.504	1.606	1.714	1.828	1.949	2.076	2.211	2.353	2.502	2.660	2.826	3.001	3.185	3.379	3.583	3.797
8	1.083	1.172	1.267	1.369	1.477	1.594	1.718	1.851	1.993	2.144	2.305	2.476	2.658	2.853	3.059	3.278	3.511	3.759	4.021	4.300	4.595
9	1.094	1.195	1.305	1.423	1.551	1.689	1.838	1.999	2.172	2.358	2.558	2.773	3.004	3.252	3.518	3.803	4.108	4.435	4.785	5.160	5.560
10	1.105	1.219	1.344	1.480	1.629	1.791	1.967	2.159	2.367	2.594	2.839	3.106	3.395	3.707	4.046	4.411	4.807	5.234	5.695	6.192	6.727
11	1.116	1.243	1.384	1.539	1.710	1.898	2.105	2.332	2.580	2.853	3.152	3.479	3.836	4.226	4.652	5.117	5.624	6.176	6.777	7.430	8.140
12	1.127	1.268	1.426	1.601	1.796	2.012	2.252	2.518	2.813	3.138	3.498	3.896	4.334	4.818	5.350	5.936	6.580	7.288	8.064	8.916	9.850
13	1.138	1.294	1.469	1.665	1.886	2.133	2.410	2.720	3.066	3.452	3.883	4.363	4.898	5.492	6.153	6.886	7.699	8.599	9.596	10.699	11.918
14	1.149	1.319	1.513	1.732	1.980	2.261	2.579	2.937	3.342	3.797	4.310	4.887	5.535	6.261	7.076	7.987	9.007	10.147	11.420	12.839	14.421
15	1.161	1.346	1.558	1.801	2.079	2.397	2.759	3.172	3.642	4.177	4.785	5.474	6.254	7.138	8.137	9.265	10.539	11.974	13.589	15.407	17.449
16	1.173	1.373	1.605	1.873	2.183	2.540	2.952	3.426	3.970	4.595	5.311	6.130	7.067	8.137	9.358	10.748	12.330	14.129	16.171	18.488	21.113
17	1.184	1.400	1.633	1.948	2.292	2.693	3.159	3.700	4.328	5.054	5.895	6.866	7.986	9.276	10.761	12.468	14.426	16.672	19.244	22.186	25.547
18	1.196	1.428	1.702	2.026	2.407	2.854	3.380	3.996	4.717	5.560	6.543	7.690	9.024	10.575	12.375	14.462	16.879	19.673	22.900	26.623	30.912
19	1.208	1.457	1.753	2.107	2.527	3.026	3.616	4.316	5.142	6.116	7.263	8.613	10.197	12.055	14.232	16.776	19.748	23.214	27.251	31.948	37.404
20	1.220	1.486	1.806	2.191	2.653	3.207	3.870	4.661	5.604	6.727	8.062	9.646	11.523	13.743	16.366	19.461	23.105	27.393	32.429	38.337	45.258
21	1.232	1.516	1.860	2.279	2.786	3.399	4.140	5.034	6.109	7.400	8.949	10.804	13.021	15.667	18.821	22.574	27.033	32.323	38.591	46.005	54.762
22	1.245	1.546	1.916	2.370	2.925	3.603	4.430	5.436	6.658	8.140	9.933	12.100	14.713	17.861	21.644	26.186	31.629	38.141	45.923	55.205	66.262
23	1.257	1.577	1.974	2.465	3.071	3.820	4.740	5.871	7.258	8.954	11.026	13.552	16.626	20.361	24.891	30.376	37.005	45.007	54.648	66.247	80.178
24	1.270	1.608	2.033	2.563	3.225	4.049	5.072	6.341	7.911	9.850	12.239	15.178	18.788	23.212	28.625	35.236	43.296	53.108	65.031	79.496	97.015
25	1.282	1.641	2.094	2.666	3.386	4.292	5.427	6.848	8.623	10.834	13.585	17.000	21.230	26.461	32.918	40.874	50.656	62.667	77.387	95.395	117.388
30	1.348	1.811	2.427	3.243	4.322	5.743	7.612	10.062	13.267	17.449	22.892	29.960	39.115	50.949	66.210	85.849	111.061	143.367	184.672	237.373	304.471
35	1.417	2.000	2.814	3.946	5.516	7.686	10.676	14.785	20.413	28.102	38.574	52.799	72.066	98.097	133.172	180.311	243.495	327.988	440.691	590.657	789.716
40	1.489	2.208	3.262	4.801	7.040	10.285	14.974	21.724	31.408	45.258	64.999	93.049	132.776	188.876	267.856	378.715	533.846	750.353	1051.642	1469.740	2048.309
45	1.565	2.438	3.781	5.841	8.985	13.764	21.002	31.920	48.325	72.888	109.527	163.985	244.629	363.662	538.752	795.429	1170.425	1716.619	2509.583	3657.176	5312.758
50	1.645	2.691	4.384	7.106	11.467	18.419	29.456	46.900	74.354	117.386	184.559	288.996	450.711	700.197	1083.619	1670.669	2566.080	3927.189	5988.730	9100.191	13779.844

TABLE A-1 (Continued)

Period	22%	23%	24%	25%	26%	27%	28%	29%	30%	31%	32%	33%	34%	35%	40%	45%	50%
1	1.220	1.230	1.240	1.250	1.260	1.270	1.280	1.290	1.300	1.310	1.320	1.330	1.340	1.350	1.400	1.450	1.500
2	1.488	1.513	1.538	1.562	1.588	1.613	1.638	1.664	1.690	1.716	1.742	1.769	1.796	1.822	1.960	2.102	2.250
3	1.816	1.861	1.907	1.953	2.000	2.048	2.097	2.147	2.197	2.248	2.300	2.353	2.406	2.460	2.744	3.049	3.375
4	2.215	2.289	2.364	2.441	2.520	2.601	2.684	2.769	2.856	2.945	3.036	3.129	3.224	3.321	3.842	4.421	5.063
5	2.703	2.815	2.932	3.052	3.176	3.304	3.436	3.572	3.713	3.858	4.007	4.162	4.320	4.484	5.378	6.410	7.594
6	3.297	3.463	3.635	3.815	4.001	4.196	4.398	4.608	4.827	5.054	5.290	5.535	5.789	6.053	7.530	9.294	11.391
7	4.023	4.259	4.508	4.768	5.042	5.329	5.629	5.945	6.275	6.621	6.983	7.361	7.758	8.172	10.541	13.476	17.086
8	4.908	5.239	5.589	5.960	6.353	6.767	7.206	7.669	8.157	8.673	9.217	9.791	10.395	11.032	14.758	19.541	25.629
9	5.987	6.444	6.931	7.451	8.004	8.595	9.223	9.893	10.604	11.362	12.166	13.022	13.930	14.894	20.661	28.334	38.443
10	7.305	7.926	8.594	9.313	10.086	10.915	11.806	12.761	13.786	14.884	16.060	17.319	18.666	20.106	28.925	41.085	57.665
11	8.912	9.749	10.657	11.642	12.708	13.862	15.112	16.462	17.921	19.498	21.199	23.034	25.012	27.144	40.495	59.573	86.498
12	10.872	11.991	13.215	14.552	16.012	17.605	19.343	21.236	23.298	25.542	27.982	30.635	33.516	36.644	56.694	86.380	129.746
13	13.264	14.749	16.386	18.190	20.175	22.359	24.759	27.395	30.287	33.460	36.937	40.745	44.912	49.469	79.371	125.251	194.620
14	16.182	18.141	20.319	22.737	25.420	28.395	31.691	35.339	39.373	43.832	48.756	54.190	60.181	66.784	111.119	181.614	291.929
15	19.742	22.314	25.195	28.422	32.030	36.062	40.565	45.587	51.185	57.420	64.358	72.073	80.643	90.158	155.567	263.341	437.894
16	24.085	27.446	31.242	35.527	40.357	45.799	51.923	58.808	66.541	75.220	84.953	95.857	108.061	121.713	217.793	381.844	656.841
17	29.384	33.758	38.740	44.409	50.850	58.165	66.461	75.862	86.503	98.539	112.138	127.490	144.802	164.312	304.911	553.674	985.261
18	35.848	41.523	48.038	55.511	64.071	73.869	85.070	97.862	112.454	129.086	148.022	169.561	194.035	221.822	426.875	802.826	1477.892
19	43.735	51.073	59.567	69.389	80.730	93.813	108.890	126.242	146.190	169.102	195.389	225.517	260.006	299.459	597.625	1164.098	2216.838
20	53.357	62.820	73.863	86.736	101.720	119.143	139.379	162.852	190.047	221.523	257.913	299.937	348.408	404.270	836.674	1687.942	3325.257
21	65.095	77.268	91.591	108.420	128.167	151.312	178.405	210.079	247.061	290.196	340.446	398.916	466.867	545.764	1171.343	2447.515	4987.883
22	79.416	95.040	113.572	135.525	161.490	192.165	228.358	271.002	321.178	380.156	449.388	530.558	625.601	736.781	1639.878	3548.896	7481.824
23	96.887	116.899	140.829	169.407	203.477	244.050	292.298	349.592	417.531	498.004	593.192	705.642	838.305	994.653	2295.829	5145.898	11222.738
24	118.203	143.786	174.628	211.758	256.381	309.943	374.141	450.974	542.791	652.385	783.013	938.504	1123.328	1342.781	3214.158	7461.547	16834.109
25	144.207	176.857	216.539	264.698	323.040	393.628	478.901	581.756	705.627	854.623	1033.577	1248.210	1505.258	1812.754	4499.816	10819.242	25251.164
30	389.748	497.904	634.810	807.793	1025.904	1300.477	1645.488	2078.208	2619.936	3297.081	4142.008	5194.516	6503.285	8128.426	24201.043	69348.375	191751.000
35	1053.370	1401.749	1861.020	2465.189	3258.053	4296.547	5653.840	7423.988	9727.598	12719.918	16598.906	21617.363	28096.695	36448.051	130158.687	*	*
40	2846.941	3946.340	5455.797	7523.156	10346.879	14195.051	19426.418	26520.723	36117.754	49072.621	66519.313	89962.188	121388.437	163433.875	700022.688	*	*
45	7694.418	11110.121	15994.316	22958.844	32859.457	46897.973	66748.500	94739.937	134102.187	*	*	*	*	*	*	*	*
50	20795.680	31278.301	46889.207	70064.812	104354.562	154942.687	229345.875	338440.000	497910.125	*	*	*	*	*	*	*	*

*Not shown because of space limitations.

TABLE A-2 Present Value Interest Factors for One Dollar Discounted at r Percent for n Periods: $PVIF_{r,n} = \frac{1}{(1+r)^n}$

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	.990	.980	.971	.962	.952	.943	.935	.926	.917	.909	.901	.893	.885	.877	.870	.862	.855	.847	.840	.833
2	.980	.961	.943	.925	.907	.890	.873	.857	.842	.826	.812	.797	.783	.769	.756	.743	.731	.718	.706	.694
3	.971	.942	.915	.889	.864	.840	.816	.794	.772	.751	.731	.712	.693	.675	.658	.641	.624	.609	.593	.579
4	.961	.924	.888	.855	.823	.792	.763	.735	.708	.683	.659	.636	.613	.592	.572	.552	.534	.516	.499	.482
5	.951	.906	.863	.822	.784	.747	.713	.681	.650	.621	.593	.567	.543	.519	.497	.476	.456	.437	.419	.402
6	.942	.888	.837	.790	.746	.705	.666	.630	.596	.564	.535	.507	.480	.456	.432	.410	.390	.370	.352	.335
7	.933	.871	.813	.760	.711	.665	.623	.583	.547	.513	.482	.452	.425	.400	.376	.354	.333	.314	.296	.279
8	.923	.853	.789	.731	.677	.627	.582	.540	.502	.467	.434	.404	.376	.351	.327	.305	.285	.266	.249	.233
9	.914	.837	.766	.703	.645	.592	.544	.500	.460	.424	.391	.361	.333	.308	.284	.263	.243	.225	.209	.194
10	.905	.820	.744	.676	.614	.558	.508	.463	.422	.386	.352	.322	.295	.270	.247	.227	.208	.191	.176	.162
11	.896	.804	.722	.650	.585	.527	.475	.429	.388	.350	.317	.287	.261	.237	.215	.195	.178	.162	.148	.135
12	.887	.789	.701	.625	.557	.497	.444	.397	.356	.319	.286	.257	.231	.208	.187	.168	.152	.137	.124	.112
13	.879	.773	.681	.601	.530	.469	.415	.368	.326	.290	.258	.229	.204	.182	.163	.145	.130	.116	.104	.093
14	.870	.758	.661	.577	.505	.442	.388	.340	.299	.263	.232	.205	.181	.160	.141	.125	.111	.099	.088	.078
15	.861	.743	.642	.555	.481	.417	.362	.315	.275	.239	.209	.183	.160	.140	.123	.108	.095	.084	.074	.065
16	.853	.728	.623	.534	.458	.394	.339	.292	.252	.218	.188	.163	.141	.123	.107	.093	.081	.071	.062	.054
17	.844	.714	.605	.513	.436	.371	.317	.270	.231	.198	.170	.146	.125	.108	.093	.080	.069	.060	.052	.045
18	.836	.700	.587	.494	.416	.350	.296	.250	.212	.180	.153	.130	.111	.095	.081	.069	.059	.051	.044	.038
19	.828	.686	.570	.475	.396	.331	.277	.232	.194	.164	.138	.116	.098	.083	.070	.060	.051	.043	.037	.031
20	.820	.673	.554	.456	.377	.312	.258	.215	.178	.149	.124	.104	.087	.073	.061	.051	.043	.037	.031	.026
21	.811	.660	.538	.439	.359	.294	.242	.199	.164	.135	.112	.093	.077	.064	.053	.044	.037	.031	.026	.022
22	.803	.647	.522	.422	.342	.278	.226	.184	.150	.123	.101	.083	.068	.056	.046	.038	.032	.026	.022	.018
23	.795	.634	.507	.406	.326	.262	.211	.170	.138	.112	.091	.074	.060	.049	.040	.033	.027	.022	.018	.015
24	.788	.622	.492	.390	.310	.247	.197	.158	.126	.102	.082	.066	.053	.043	.035	.028	.023	.019	.015	.013
25	.780	.610	.478	.375	.295	.233	.184	.146	.116	.092	.074	.059	.047	.038	.030	.024	.020	.016	.013	.010
30	.742	.552	.412	.308	.231	.174	.131	.099	.075	.057	.044	.033	.026	.020	.015	.012	.009	.007	.005	.004
35	.706	.500	.355	.253	.181	.130	.094	.068	.049	.036	.026	.019	.014	.010	.008	.006	.004	.003	.002	.002
40	.672	.453	.307	.208	.142	.097	.067	.046	.032	.022	.015	.011	.008	.005	.004	.003	.002	.001	.001	.001
45	.639	.410	.264	.171	.111	.073	.048	.031	.021	.014	.009	.006	.004	.003	.002	.001	.001	.001	*	*
50	.608	.372	.228	.141	.087	.054	.034	.021	.013	.009	.005	.003	.002	.001	.001	.001	*	*	*	*

*PVIF is zero to three decimal places.

TABLE A-2 (Continued)

Period	21%	22%	23%	24%	25%	26%	27%	28%	29%	30%	31%	32%	33%	34%	35%	40%	45%	50%
1	.826	.820	.813	.806	.800	.794	.787	.781	.775	.769	.763	.758	.752	.746	.741	.714	.690	.667
2	.683	.672	.661	.650	.640	.630	.620	.610	.601	.592	.583	.574	.565	.557	.549	.510	.476	.444
3	.564	.551	.537	.524	.512	.500	.488	.477	.466	.455	.445	.435	.425	.416	.406	.364	.328	.296
4	.467	.451	.437	.423	.410	.397	.384	.373	.361	.350	.340	.329	.320	.310	.301	.260	.226	.198
5	.386	.370	.355	.341	.328	.315	.303	.291	.280	.269	.259	.250	.240	.231	.223	.186	.156	.132
6	.319	.303	.289	.275	.262	.250	.238	.227	.217	.207	.198	.189	.181	.173	.165	.133	.108	.088
7	.263	.249	.235	.222	.210	.198	.188	.178	.168	.159	.151	.143	.136	.129	.122	.095	.074	.059
8	.218	.204	.191	.179	.168	.157	.148	.139	.130	.123	.115	.108	.102	.096	.091	.068	.051	.039
9	.180	.167	.155	.144	.134	.125	.116	.108	.101	.094	.088	.082	.077	.072	.067	.048	.035	.026
10	.149	.137	.126	.116	.107	.099	.092	.085	.078	.073	.067	.062	.058	.054	.050	.035	.024	.017
11	.123	.112	.103	.094	.086	.079	.072	.066	.061	.056	.051	.047	.043	.040	.037	.025	.017	.012
12	.102	.092	.083	.076	.069	.062	.057	.052	.047	.043	.039	.036	.033	.030	.027	.018	.012	.008
13	.084	.075	.068	.061	.055	.050	.045	.040	.037	.033	.030	.027	.025	.022	.020	.013	.008	.005
14	.069	.062	.055	.049	.044	.039	.035	.032	.028	.025	.023	.021	.018	.017	.015	.009	.006	.003
15	.057	.051	.045	.040	.035	.031	.028	.025	.022	.020	.017	.016	.014	.012	.011	.006	.004	.002
16	.047	.042	.036	.032	.028	.025	.022	.019	.017	.015	.013	.012	.010	.009	.008	.005	.003	.002
17	.039	.034	.030	.026	.023	.020	.017	.015	.013	.012	.010	.009	.008	.007	.006	.003	.002	.001
18	.032	.028	.024	.021	.018	.016	.014	.012	.010	.009	.008	.007	.006	.005	.005	.002	.001	.001
19	.027	.023	.020	.017	.014	.012	.011	.009	.008	.007	.006	.005	.004	.004	.003	.002	.001	*
20	.022	.019	.016	.014	.012	.010	.008	.007	.006	.005	.004	.003	.003	.003	.002	.001	.001	*
21	.018	.015	.013	.011	.009	.008	.007	.006	.005	.004	.003	.003	.003	.002	.002	.001	*	*
22	.015	.013	.011	.009	.007	.006	.005	.004	.004	.003	.003	.002	.002	.002	.001	.001	*	*
23	.012	.010	.009	.007	.006	.005	.004	.003	.003	.002	.002	.002	.001	.001	.001	*	*	*
24	.010	.008	.007	.006	.005	.004	.003	.003	.002	.002	.002	.001	.001	.001	.001	*	*	*
25	.009	.007	.006	.005	.004	.003	.003	.002	.002	.001	.001	.001	.001	.001	.001	*	*	*
30	.003	.003	.002	.002	.001	.001	.001	.001	*	*	*	*	*	*	*	*	*	*
35	.001	.001	.001	.001	*	*	*	*	*	*	*	*	*	*	*	*	*	*
40	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
45	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
50	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

*PVIF is zero to three decimal places.

TABLE A-3 Future Value Interest Factors for a One-Dollar Ordinary Annuity Compounded at *r* Percent
for *n* Periods: $FVIFA_{r,n} = \sum_{t=1}^n (1 + r)^{t-1}$

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	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	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	2.110	2.120	2.130	2.140	2.150	2.160	2.170	2.180	2.190	2.200
3	3.030	3.060	3.091	3.122	3.152	3.184	3.215	3.246	3.278	3.310	3.342	3.374	3.407	3.440	3.472	3.506	3.539	3.572	3.606	3.640
4	4.060	4.122	4.184	4.246	4.310	4.375	4.440	4.506	4.573	4.641	4.710	4.779	4.850	4.921	4.993	5.066	5.141	5.215	5.291	5.368
5	5.101	5.204	5.309	5.416	5.526	5.637	5.751	5.867	5.985	6.105	6.228	6.353	6.480	6.610	6.742	6.877	7.014	7.154	7.297	7.442
6	6.152	6.308	6.468	6.633	6.802	6.975	7.153	7.336	7.523	7.716	7.913	8.115	8.323	8.535	8.754	8.977	9.207	9.442	9.683	9.930
7	7.214	7.434	7.662	7.898	8.142	8.394	8.654	8.923	9.200	9.487	9.783	10.089	10.405	10.730	11.067	11.414	11.772	12.141	12.523	12.916
8	8.286	8.583	8.892	9.214	9.549	9.897	10.260	10.637	11.028	11.436	11.859	12.300	12.757	13.233	13.727	14.240	14.773	15.327	15.902	16.499
9	9.368	9.755	10.159	10.583	11.027	11.491	11.978	12.488	13.021	13.579	14.164	14.776	15.416	16.085	16.786	17.518	18.285	19.086	19.923	20.799
10	10.462	10.950	11.464	12.006	12.578	13.181	13.816	14.487	15.193	15.937	16.722	17.549	18.420	19.337	20.304	21.321	22.393	23.521	24.709	25.959
11	11.567	12.169	12.808	13.486	14.207	14.972	15.784	16.645	17.560	18.531	19.561	20.655	21.814	23.044	24.349	25.733	27.200	28.755	30.403	32.150
12	12.682	13.412	14.192	15.026	15.917	16.870	17.888	18.977	20.141	21.384	22.713	24.133	25.650	27.271	29.001	30.850	32.824	34.931	37.180	39.580
13	13.809	14.680	15.618	16.627	17.713	18.882	20.141	21.495	22.953	24.523	26.211	28.029	29.984	32.088	34.352	36.786	39.404	42.218	45.244	48.496
14	14.947	15.974	17.086	18.292	19.598	21.015	22.550	24.215	26.019	27.975	30.095	32.392	34.882	37.581	40.504	43.672	47.102	50.818	54.841	59.196
15	16.097	17.293	18.599	20.023	21.578	23.276	25.129	27.152	29.361	31.772	34.405	37.280	40.417	43.842	47.580	51.659	56.109	60.965	66.260	72.035
16	17.258	18.639	20.157	21.824	23.657	25.672	27.888	30.324	33.003	35.949	39.190	42.753	46.671	50.980	55.717	60.925	66.648	72.938	79.850	87.442
17	18.430	20.012	21.761	23.697	25.840	28.213	30.840	33.750	36.973	40.544	44.500	48.883	53.738	59.117	65.075	71.673	78.978	87.067	96.021	105.930
18	19.614	21.412	23.414	25.645	28.132	30.905	33.999	37.450	41.301	45.599	50.396	55.749	61.724	68.393	75.836	84.140	93.404	103.739	115.265	128.116
19	20.811	22.840	25.117	27.671	30.539	33.760	37.379	41.446	46.018	51.158	56.939	63.439	70.748	78.968	88.211	98.603	110.283	123.412	138.165	154.739
20	22.019	24.297	26.870	29.778	33.066	36.785	40.995	45.762	51.159	57.274	64.202	72.052	80.946	91.024	102.443	115.379	130.031	146.626	165.417	186.687
21	23.239	25.783	28.676	31.969	35.719	39.992	44.865	50.422	56.764	64.002	72.264	81.698	92.468	104.767	118.809	134.840	153.136	174.019	197.846	225.024
22	24.471	27.299	30.536	34.248	38.505	43.392	49.005	55.456	62.872	71.402	81.213	92.502	105.489	120.434	137.630	157.414	180.169	206.342	236.436	271.028
23	25.716	28.845	32.452	36.618	41.430	46.995	53.435	60.893	69.531	79.542	91.147	104.602	120.203	138.295	159.274	183.600	211.798	244.483	282.359	326.234
24	26.973	30.421	34.426	39.082	44.501	50.815	58.176	66.764	76.789	88.496	102.173	118.154	136.829	158.656	184.166	213.976	248.803	289.490	337.007	392.480
25	28.243	32.030	36.459	41.645	47.726	54.864	63.248	73.105	84.699	98.346	114.412	133.333	155.616	181.867	212.790	249.212	292.099	342.598	402.038	471.976
30	34.784	40.567	47.575	56.084	66.438	79.057	94.459	113.282	136.305	164.491	199.018	241.330	293.192	356.778	434.738	530.306	647.423	790.932	966.698	1181.865
35	41.659	49.994	60.461	73.651	90.318	111.432	138.234	172.314	215.705	271.018	341.583	431.658	546.663	693.552	881.152	1120.699	1426.448	1816.607	2314.173	2948.294
40	48.885	60.401	75.400	95.024	120.797	154.758	199.630	259.052	337.872	442.580	581.812	767.080	1013.667	1341.979	1779.048	2360.724	3134.412	4163.094	5529.711	7343.715
45	56.479	71.891	92.718	121.027	159.695	212.737	285.741	386.497	525.840	718.881	986.613	1338.208	1874.086	2590.464	3585.031	4965.191	6879.008	9531.258	13203.105	18280.914
50	64.461	84.577	112.794	152.664	209.341	290.325	406.516	573.756	815.051	1163.865	1668.723	2399.975	3459.344	4994.301	7217.488	10435.449	15088.805	21812.273	31514.492	45496.094

TABLE A-3 (Continued)

Period	21%	22%	23%	24%	25%	26%	27%	28%	29%	30%	31%	32%	33%	34%	35%	40%	45%	50%
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	2.210	2.220	2.230	2.240	2.250	2.260	2.270	2.280	2.290	2.300	2.310	2.320	2.330	2.340	2.350	2.400	2.450	2.500
3	3.674	3.708	3.743	3.778	3.813	3.848	3.883	3.918	3.954	3.990	4.026	4.062	4.099	4.136	4.172	4.360	4.552	4.750
4	5.446	5.524	5.604	5.684	5.766	5.848	5.931	6.016	6.101	6.187	6.274	6.362	6.452	6.542	6.633	7.104	7.601	8.125
5	7.589	7.740	7.893	8.048	8.207	8.368	8.533	8.700	8.870	9.043	9.219	9.398	9.581	9.766	9.954	10.946	12.022	13.188
6	10.183	10.442	10.708	10.980	11.259	11.544	11.837	12.136	12.442	12.756	13.077	13.406	13.742	14.086	14.438	16.324	18.431	20.781
7	13.321	13.740	14.171	14.615	15.073	15.546	16.032	16.534	17.051	17.583	18.131	18.696	19.277	19.876	20.492	23.853	27.725	32.172
8	17.119	17.762	18.430	19.123	19.842	20.588	21.361	22.163	22.995	23.858	24.752	25.678	26.638	27.633	28.664	34.395	41.202	49.258
9	21.714	22.670	23.669	24.712	25.802	26.940	28.129	29.369	30.664	32.015	33.425	34.895	36.429	38.028	39.696	49.152	60.743	74.887
10	27.274	28.657	30.113	31.643	33.253	34.945	36.723	38.592	40.556	42.619	44.786	47.062	49.451	51.958	54.590	69.813	89.077	113.330
11	34.001	35.962	38.039	40.238	42.566	45.030	47.639	50.398	53.318	56.405	59.670	63.121	66.769	70.624	74.696	98.739	130.161	170.995
12	42.141	44.873	47.787	50.895	54.208	57.738	61.501	65.510	69.780	74.326	79.167	84.320	89.803	95.636	101.840	139.234	189.734	257.493
13	51.991	55.745	59.778	64.109	68.760	73.750	79.106	84.853	91.016	97.624	104.709	112.302	120.438	129.152	138.484	195.928	276.114	387.239
14	63.909	69.009	74.528	80.496	86.949	93.925	101.465	109.611	118.411	127.912	138.169	149.239	161.183	174.063	187.953	275.299	401.365	581.858
15	78.330	85.191	92.669	100.815	109.687	119.346	129.860	141.302	153.750	167.285	182.001	197.996	215.373	234.245	254.737	386.418	582.980	873.788
16	95.779	104.933	114.983	126.010	138.109	151.375	165.922	181.867	199.337	218.470	239.421	262.354	287.446	314.888	344.895	541.985	846.321	1311.681
17	116.892	129.019	142.428	157.252	173.636	191.733	211.721	233.790	258.145	285.011	314.642	347.307	383.303	422.949	466.608	759.778	1228.165	1968.522
18	142.439	158.403	176.187	195.993	218.045	242.583	269.885	300.250	334.006	371.514	413.180	459.445	510.792	567.751	630.920	1064.689	1781.838	2953.783
19	173.351	194.251	217.710	244.031	273.556	306.654	343.754	385.321	431.868	483.968	542.266	607.467	680.354	761.786	852.741	1491.563	2584.665	4431.672
20	210.755	237.986	268.783	303.598	342.945	387.384	437.568	494.210	558.110	630.157	711.368	802.856	905.870	1021.792	1152.200	2089.188	3748.763	6648.508
21	256.013	291.343	331.603	377.461	429.681	489.104	556.710	633.589	720.962	820.204	932.891	1060.769	1205.807	1370.201	1556.470	2925.862	5436.703	9973.762
22	310.775	356.438	408.871	469.052	538.101	617.270	708.022	811.993	931.040	1067.265	1223.087	1401.215	1604.724	1837.068	2102.234	4097.203	7884.215	14961.645
23	377.038	435.854	503.911	582.624	673.626	778.760	900.187	1040.351	1202.042	1388.443	1603.243	1850.603	2135.282	2462.669	2839.014	5737.078	11433.109	22443.469
24	457.215	532.741	620.810	723.453	843.032	982.237	1144.237	1332.649	1551.634	1805.975	2101.247	2443.795	2840.924	3300.974	3833.667	8032.906	16579.008	33666.207
25	554.230	650.944	764.596	898.082	1054.791	1238.617	1454.180	1706.790	2002.608	2348.765	2753.631	3226.808	3779.428	4424.301	5176.445	11247.062	24040.555	50500.316
30	1445.111	1767.044	2160.459	2640.881	3227.172	3941.953	4812.891	5873.172	7162.785	8729.805	10632.543	12940.672	15737.945	19124.434	23221.258	60500.207	154105.313	383500.000
35	3755.814	4783.520	6090.227	7750.094	9856.746	12527.160	15909.480	20188.742	25596.512	32422.090	41028.887	51868.563	65504.199	82634.625	104134.500	325394.688	*	*
40	9749.141	12936.141	17153.691	22728.367	30088.621	39791.957	52570.707	69376.562	91447.375	120389.375	*	*	*	*	*	*	*	*
45	25294.223	34970.230	48300.660	66638.937	91831.312	126378.937	173692.875	238384.312	326686.375	447005.062	*	*	*	*	*	*	*	*

*Not shown because of space limitations.

TABLE A-4 Present Value Interest Factors for a One-Dollar Annuity Discounted at *r* Percent for *n* Periods: $PVIFA_{r,n} = \sum_{t=1}^n \frac{1}{(1+r)^t}$

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	.990	.980	.971	.962	.952	.943	.935	.926	.917	.909	.901	.893	.885	.877	.870	.862	.855	.847	.840	.833
2	1.970	1.942	1.913	1.886	1.859	1.833	1.808	1.783	1.759	1.736	1.713	1.690	1.668	1.647	1.626	1.605	1.585	1.566	1.547	1.528
3	2.941	2.884	2.829	2.775	2.723	2.673	2.624	2.577	2.531	2.487	2.444	2.402	2.361	2.322	2.283	2.246	2.210	2.174	2.140	2.106
4	3.902	3.808	3.717	3.630	3.546	3.465	3.387	3.312	3.240	3.170	3.102	3.037	2.974	2.914	2.855	2.798	2.743	2.690	2.639	2.589
5	4.853	4.713	4.580	4.452	4.329	4.212	4.100	3.993	3.890	3.791	3.696	3.605	3.517	3.433	3.352	3.274	3.199	3.127	3.058	2.991
6	5.795	5.601	5.417	5.242	5.076	4.917	4.767	4.623	4.486	4.355	4.231	4.111	3.998	3.889	3.784	3.685	3.589	3.498	3.410	3.326
7	6.728	6.472	6.230	6.002	5.786	5.582	5.389	5.206	5.033	4.868	4.712	4.564	4.423	4.288	4.160	4.039	3.922	3.812	3.706	3.605
8	7.652	7.326	7.020	6.733	6.463	6.210	5.971	5.747	5.535	5.335	5.146	4.968	4.799	4.639	4.487	4.344	4.207	4.078	3.954	3.837
9	8.566	8.162	7.786	7.435	7.108	6.802	6.515	6.247	5.995	5.759	5.537	5.328	5.132	4.946	4.772	4.607	4.451	4.303	4.163	4.031
10	9.471	8.983	8.530	8.111	7.722	7.360	7.024	6.710	6.418	6.145	5.889	5.650	5.426	5.216	5.019	4.833	4.659	4.494	4.339	4.192
11	10.368	9.787	9.253	8.760	8.306	7.887	7.499	7.139	6.805	6.495	6.207	5.938	5.687	5.453	5.234	5.029	4.836	4.656	4.486	4.327
12	11.255	10.575	9.954	9.385	8.863	8.384	7.943	7.536	7.161	6.814	6.492	6.194	5.918	5.660	5.421	5.197	4.988	4.793	4.611	4.439
13	12.134	11.348	10.635	9.986	9.394	8.853	8.358	7.904	7.487	7.013	6.750	6.424	6.122	5.842	5.583	5.342	5.118	4.910	4.715	4.533
14	13.004	12.106	11.296	10.563	9.899	9.295	8.745	8.244	7.786	7.367	6.982	6.628	6.302	6.002	5.724	5.468	5.229	5.008	4.802	4.611
15	13.865	12.849	11.938	11.118	10.380	9.712	9.108	8.560	8.061	7.606	7.191	6.811	6.462	6.142	5.847	5.575	5.324	5.092	4.876	4.675
16	14.718	13.578	12.561	11.652	10.838	10.106	9.447	8.851	8.313	7.824	7.379	6.974	6.604	6.265	5.954	5.668	5.405	5.162	4.938	4.730
17	15.562	14.292	13.166	12.166	11.274	10.477	9.763	9.122	8.544	8.022	7.549	7.120	6.729	6.373	6.047	5.749	5.475	5.222	4.990	4.775
18	16.398	14.992	13.754	12.659	11.690	10.828	10.059	9.372	8.756	8.201	7.702	7.250	6.840	6.467	6.128	5.818	5.534	5.273	5.033	4.812
19	17.226	15.679	14.324	13.134	12.085	11.158	10.336	9.604	8.950	8.365	7.839	7.366	6.938	6.550	6.198	5.877	5.584	5.316	5.070	4.843
20	18.046	16.352	14.878	13.590	12.462	11.470	10.594	9.818	9.129	8.514	7.963	7.469	7.025	6.623	6.259	5.929	5.628	5.353	5.101	4.870
21	18.857	17.011	15.415	14.029	12.821	11.764	10.836	10.017	9.292	8.649	8.075	7.562	7.102	6.687	6.312	5.973	5.665	5.384	5.127	4.891
22	19.661	17.658	15.937	14.451	13.163	12.042	11.061	10.201	9.442	8.772	8.176	7.645	7.170	6.743	6.359	6.011	5.696	5.410	5.149	4.909
23	20.456	18.292	16.444	14.857	13.489	12.303	11.272	10.371	9.580	8.883	8.266	7.718	7.230	6.792	6.399	6.044	5.723	5.432	5.167	4.925
24	21.244	18.914	16.936	15.247	13.799	12.550	11.469	10.529	9.707	8.985	8.348	7.784	7.283	6.835	6.434	6.073	5.746	5.451	5.182	4.937
25	22.023	19.524	17.413	15.622	14.094	12.783	11.654	10.675	9.823	9.077	8.422	7.843	7.330	6.873	6.464	6.097	5.766	5.467	5.195	4.948
30	25.808	22.396	19.601	17.292	15.373	13.765	12.409	11.258	10.274	9.427	8.694	8.055	7.496	7.003	6.566	6.177	5.829	5.517	5.235	4.979
35	29.409	24.999	21.487	18.665	16.374	14.498	12.948	11.655	10.567	9.644	8.855	8.176	7.586	7.070	6.617	6.215	5.858	5.539	5.251	4.992
40	32.835	27.356	23.115	19.793	17.159	15.046	13.332	11.925	10.757	9.779	8.951	8.244	7.634	7.105	6.642	6.233	5.871	5.548	5.258	4.997
45	36.095	29.490	24.519	20.720	17.774	15.456	13.606	12.108	10.881	9.863	9.008	8.283	7.661	7.123	6.654	6.242	5.877	5.552	5.261	4.999
50	39.196	31.424	25.730	21.482	18.256	15.762	13.801	12.233	10.962	9.915	9.042	8.304	7.675	7.133	6.661	6.246	5.880	5.554	5.262	4.999

TABLE A-4 (Continued)

Period	21%	22%	23%	24%	25%	26%	27%	28%	29%	30%	31%	32%	33%	34%	35%	40%	45%	50%
1	.826	.820	.813	.806	.800	.794	.787	.781	.775	.769	.763	.758	.752	.746	.741	.714	.690	.667
2	1.509	1.492	1.474	1.457	1.440	1.424	1.407	1.392	1.376	1.361	1.346	1.331	1.317	1.303	1.289	1.224	1.165	1.111
3	2.074	2.042	2.011	1.981	1.952	1.923	1.896	1.868	1.842	1.816	1.791	1.766	1.742	1.719	1.696	1.589	1.493	1.407
4	2.540	2.494	2.448	2.404	2.362	2.320	2.280	2.241	2.203	2.166	2.130	2.096	2.062	2.029	1.997	1.849	1.720	1.605
5	2.926	2.864	2.803	2.745	2.689	2.635	2.583	2.532	2.483	2.436	2.390	2.345	2.302	2.260	2.220	2.035	1.876	1.737
6	3.245	3.167	3.092	3.020	2.951	2.885	2.821	2.759	2.700	2.643	2.588	2.534	2.483	2.433	2.385	2.168	1.983	1.824
7	3.508	3.416	3.327	3.242	3.161	3.083	3.009	2.937	2.868	2.802	2.739	2.677	2.619	2.562	2.508	2.263	2.057	1.883
8	3.726	3.619	3.518	3.421	3.329	3.241	3.156	3.076	2.999	2.925	2.854	2.786	2.721	2.658	2.598	2.331	2.109	1.922
9	3.905	3.786	3.673	3.566	3.463	3.366	3.273	3.184	3.100	3.019	2.942	2.868	2.798	2.730	2.665	2.379	2.144	1.948
10	4.054	3.923	3.799	3.682	3.570	3.465	3.364	3.269	3.178	3.092	3.009	2.930	2.855	2.784	2.715	2.414	2.168	1.965
11	4.177	4.035	3.902	3.776	3.656	3.544	3.437	3.335	3.239	3.147	3.060	2.978	2.899	2.824	2.752	2.438	2.185	1.977
12	4.278	4.127	3.985	3.851	3.725	3.606	3.493	3.387	3.286	3.190	3.100	3.013	2.931	2.853	2.779	2.456	2.196	1.985
13	4.362	4.203	4.053	3.912	3.780	3.656	3.538	3.427	3.322	3.223	3.129	3.040	2.956	2.876	2.799	2.469	2.204	1.990
14	4.432	4.265	4.108	3.962	3.824	3.695	3.573	3.459	3.351	3.249	3.152	3.061	2.974	2.892	2.814	2.478	2.210	1.993
15	4.489	4.315	4.153	4.001	3.859	3.726	3.601	3.483	3.373	3.268	3.170	3.076	2.988	2.905	2.825	2.484	2.214	1.995
16	4.536	4.357	4.189	4.033	3.887	3.751	3.623	3.503	3.390	3.283	3.183	3.088	2.999	2.914	2.834	2.489	2.216	1.997
17	4.576	4.391	4.219	4.059	3.910	3.771	3.640	3.518	3.403	3.295	3.193	3.097	3.007	2.921	2.840	2.492	2.218	1.998
18	4.608	4.419	4.243	4.080	3.928	3.786	3.654	3.529	3.413	3.304	3.201	3.104	3.012	2.926	2.844	2.494	2.219	1.999
19	4.635	4.442	4.263	4.097	3.942	3.799	3.664	3.539	3.421	3.311	3.207	3.109	3.017	2.930	2.848	2.496	2.220	1.999
20	4.657	4.460	4.279	4.110	3.954	3.808	3.673	3.546	3.427	3.316	3.211	3.113	3.020	2.933	2.850	2.497	2.221	1.999
21	4.675	4.476	4.292	4.121	3.963	3.816	3.679	3.551	3.432	3.320	3.215	3.116	3.023	2.935	2.852	2.498	2.221	2.000
22	4.690	4.488	4.302	4.130	3.970	3.822	3.684	3.556	3.436	3.323	3.217	3.118	3.025	2.936	2.853	2.498	2.222	2.000
23	4.703	4.499	4.311	4.137	3.976	3.827	3.689	3.559	3.438	3.325	3.219	3.120	3.026	2.938	2.854	2.499	2.222	2.000
24	4.713	4.507	4.318	4.143	3.981	3.831	3.692	3.562	3.441	3.327	3.221	3.121	3.027	2.939	2.855	2.499	2.222	2.000
25	4.721	4.514	4.323	4.147	3.985	3.834	3.694	3.564	3.442	3.329	3.222	3.122	3.028	2.939	2.856	2.499	2.222	2.000
30	4.746	4.534	4.339	4.160	3.995	3.842	3.701	3.569	3.447	3.332	3.225	3.124	3.030	2.941	2.857	2.500	2.222	2.000
35	4.756	4.541	4.345	4.164	3.998	3.845	3.703	3.571	3.448	3.333	3.226	3.125	3.030	2.941	2.857	2.500	2.222	2.000
40	4.760	4.544	4.347	4.166	3.999	3.846	3.703	3.571	3.448	3.333	3.226	3.125	3.030	2.941	2.857	2.500	2.222	2.000
45	4.761	4.545	4.347	4.166	4.000	3.846	3.704	3.571	3.448	3.333	3.226	3.125	3.030	2.941	2.857	2.500	2.222	2.000
50	4.762	4.545	4.348	4.167	4.000	3.846	3.704	3.571	3.448	3.333	3.226	3.125	3.030	2.941	2.857	2.500	2.222	2.000