

UNIVERSITI SAINS MALAYSIA

Peperiksaan Semester Pertama  
Sidang 1992/93

Oktober/November, 1992

AKP300 - PENGURUSAN KEWANGAN

Masa: [3 jam]

ARAHAN

Sila pastikan bahawa kertas peperiksaan ini mengandungi **SEPULUH** muka surat yang bercetak sebelum anda memulakan peperiksaan ini.

Jawab **SEMBILAN** soalan. Jawab **LIMA** soalan daripada Bahagian A dan **EMPAT** soalan daripada Bahagian B.

Bahagian A

Jawab **LIMA** soalan sahaja.

1. Syarikat Sam Sa mempunyai struktur modal yang disasar seperti berikut: 50% hutang dan 50% ekuiti. Pengurus syarikat menganggarkan perolehan tertahan sebanyak \$16.2 juta dan dividen yang baru dibayarkannya ialah \$1.00 sesyer. Kadar pertumbuhan firma dijangka pada 10% setahun. Saham biasanya sekarang ini dijual pada harga \$28.25 sesyer. Kos pengampongan untuk pengeluaran yang baru ialah 15%. Kos hutang sebelum cukai ialah 12% dan kadar cukai syarikat ialah 40%.

Untuk tahun hadapan, perbelanjaan modal untuk projek-projek berikut dan kadar pulangan berkaitan dengannya telah dijangkakan:

|          | <u>Amaun (juta)</u> | <u>KPD (IRR)</u> |
|----------|---------------------|------------------|
| Projek A | \$20                | 14.0%            |
| Projek B | 10                  | 12.0%            |
| Projek C | 10                  | 10.5%            |
| Projek D | 20                  | 9.2%             |
| Jumlah   | <u>\$60</u>         |                  |

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Andaikan bahawa semua perolehan tertahan akan digunakan sebelum saham baru dikeluarkan.

- (a) Apakah kos hutang dan kos perolehan tertahannya?
- (b) Pada permulaannya, apakah purata wajaran kos modalnya?
- (c) Berapa banyak modal baru yang boleh didapati oleh syarikat ini sebelum kos sut modalnya meningkat? Apakah kos ekuiti baru dan purata wajaran kos modalnya apabila saham baru dikeluarkan?
- (d) Grafkan skedju peluang pelaburan (IOS) dan skedju sut kos modal (MCC). Apakah belanjawan modal syarikat yang optima? Projek yang manakah harus diterima?

[12 markah]

2. Dividen terakhir Syarikat Deekay ialah \$1.00. Dividen ini dijangka meningkat pada kadar 20% pada tahun ini, 15% pada tahun hadapan, 10% pada tahun berikutnya dan 5% tahun seterusnya. Maka  $g_1 = 20\%$ ,  $g_2 = 15\%$ ,  $g_3 = 10\%$  dan  $g_n = 5\%$ . Ks ialah 15%, carikan nilai saham ini pada:

- (a) masa sekarang.
- (b) 5 tahun dari sekarang.
- (c) hari ini bagi pelabur yang merancang hendak membeli saham ini dan memegangnya untuk satu tahun sebelum menjualkannya.

[12 markah]

3. Anda telah diminta oleh presiden syarikat anda untuk menilai cadangan membeli sebuah van untuk kegunaan pengangkutan barangan keluaran syarikat. Harga asas van ialah \$50,000 dan \$10,000 tambahan akan diperlukan untuk mengubahsuaikan bahagian dalam van tersebut. Van itu boleh disusutnilaikan berdasarkan jadual yang berikut: tahun 1, 33%; tahun 2, 45%; tahun 3, 15%; dan tahun 4, 7%. Pada akhir tahun 3, van itu akan dijual pada harga \$20,000. Penggunaan van itu akan meningkatkan modal kerja bersih sebanyak \$2,000. Juga dijangkakan penggunaan van itu tidak akan memberi kesan ke atas hasil, tetapi kos operasi sebelum cukai terutamanya yang berkaitan dengan kos buruh, boleh dijimatkan sebanyak \$20,000 setahun. Kadar cukai syarikat ialah 40%.

...3/-

(a) Dapatkan:

- (i) jumlah pelaburan permulaannya.
- (ii) aliran tunai daripada operasi pada tahun 1.
- (iii) aliran tunai tambahan (bukan daripada operasi) pada akhir tahun 3.

(b) Sekiranya kos modal ialah 10%, haruskah van itu dibeli? Tunjukkan pengiraan.

[12 markah]

4. Syarikat Sukma sedang di dalam proses menentukan polisi kewangannya. Dua alternatif pembiayaan sedang dipertimbangkan:

A: 200,000 syer saham biasa pada \$4 sesyer; dan pinjaman \$600,000 pada kadar bunga 14%.

B: 400,000 syer saham biasa pada \$4 sesyer; dan pinjaman \$300,000 pada kadar bunga 12%.

Berikut ialah anggaran pendapatan sebelum bunga dan cukai (EBIT) bagi syarikat.

| Keadaan ekonomi | Kebarangkalian | EBIT      |
|-----------------|----------------|-----------|
| Lemah           | 0.1            | \$160,000 |
| Biasa           | 0.8            | \$200,000 |
| Boom            | 0.1            | \$240,000 |

Kadar cukai syarikat ialah 40%.

- (a) Carikan pendapatan sesyer (EPS) yang dijangka untuk setiap alternatif pembiayaan.
- (b) Carikan tahap titik persilangan EBIT dan EPS untuk kedua-dua alternatif tersebut.

[12 markah]

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5. Firma anda sedang mempertimbangkan dua pelaburan berikut yang saling eksklusif.

| <u>Tahun</u> | <u>Aliran tunai</u> |           |
|--------------|---------------------|-----------|
|              | <u>A</u>            | <u>B</u>  |
| 0            | -\$14,000           | -\$14,000 |
| 1            | 4,500               | 0         |
| 2            | 4,500               | 0         |
| 3            | 4,500               | 0         |
| 4            | 4,500               | 0         |
| 5            | 4,500               | 30,000    |

Kos modal firma ialah 12%.

- (a) Kirakan nilai kini bersih (NKB); kadar pulangan dalaman (IRR) dan kadar pulangan dalaman yang diperbaiki (MIRR) untuk pelaburan A dan B.
- (b) Pelaburan mana akan dipilih dengan mengguna kaedah NKB, IRR dan MIRR. Adakah terdapat konflik pada pilihan antara kaedah NKB dan IRR? Antara NKB dan MIRR? Terangkan.

[12 markah]

6. Syarikat IRMA Berhad ingin menjualkan sahamnya melalui terbitan hak. Syarikat telah mengeluarkan 1 juta syer pada harga \$90 sesyer. Terbitan yang baru ini digunakan untuk mendapatkan ekuiti baru berjumlah \$8 juta. Setiap pemegang saham yang asalnya akan menerima satu hak pembelian untuk setiap syer yang dipegangnya.

- (a) Sekiranya harga pohon beli ialah \$80, berapakah bilangan syer yang mesti dijual? Berapakah bilangan hak sesyer saham baru yang diperlukan? Apakah nilai satu hak?
- (b) Apakah antara kebaikan dan keburukkan meletakkan harga pohon beli yang rendah?

[12 markah]

...5/-

**Bahagian B**

Jawab **EMPAT** soalan sahaja.

7. Bincangkan:

- (a) Bagaimana pengurangan nisbah pembayaran dividen dikatakan boleh meningkatkan harga saham, dan
- (b) Bagaimana pula pengurangan tersebut boleh mengurangkan harga saham.

[10 markah]

8. Terangkan bagaimana analisis kepekaan digunakan? Apakah kebaikan dan keburukkan kaedah ini untuk mengukur risiko pada belanjawan modal?

[10 markah]

9. Terangkan secara ringkas teori struktur modal yang berikut:

- (a) Teori Modigliani-Miller (MM) tanpa cukai korporate.
- (b) Teori Modigliani-Miller (MM) dengan cukai korporate.
- (c) Teori penukaran struktur modal.
- (d) Teori maklumat tidak simetri.

[10 markah]

10. (a) Apakah sebab-sebab percantuman dilakukan dan terangkan jenis-jenis percantuman yang selalu berlaku?
- (b) Terangkan perbezaan antara kaedah perakaunan pengumpulan kepentingan bersama dan perakaunan bentuk belian untuk percantuman?

[10 markah]

...6/-

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11. (a) Terangkan bagaimana risiko boleh dikurangkan melalui pelbagai.
- (b) Terangkan perbezaan antara kadar pulangan nominal bagi bon yang membayar kupon dua kali setahun dengan kadar pulangan sebenar tahunannya. Di dalam keadaan yang bagaimanakah harus setiap pengukuran pulangan itu digunakan?

[10 markah]

...7/-

LAMP IRAN A

FINANCIAL MANAGEMENT George A. Aragon

Table A.1 Future value of \$1 at the end of n periods:  $FVF(k, n) = (1 + k)^n$

| Period | 1%     | 2%     | 3%     | 4%     | 5%     | 6%     | 7%     | 8%     | 9%     | 10%    | 11%    | 12%    | 13%    | 14%    | 15%    | 16%    | 17%    | 18%    | 19%    | 20%    |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1      | 1.0100 | 1.0200 | 1.0300 | 1.0400 | 1.0500 | 1.0600 | 1.0700 | 1.0800 | 1.0900 | 1.1000 | 1.1100 | 1.1200 | 1.1300 | 1.1400 | 1.1500 | 1.1600 | 1.1700 | 1.1800 | 1.1900 | 1.2000 |
| 2      | 1.0201 | 1.0404 | 1.0609 | 1.0816 | 1.1025 | 1.1236 | 1.1449 | 1.1664 | 1.1881 | 1.2100 | 1.2321 | 1.2544 | 1.2769 | 1.2996 | 1.3225 | 1.3456 | 1.3689 | 1.3924 | 1.4161 | 1.4400 |
| 3      | 1.0303 | 1.0612 | 1.0927 | 1.1249 | 1.1576 | 1.1910 | 1.2250 | 1.2597 | 1.2950 | 1.3310 | 1.3676 | 1.4049 | 1.4429 | 1.4815 | 1.5209 | 1.5609 | 1.6016 | 1.6430 | 1.6852 | 1.7280 |
| 4      | 1.0406 | 1.0824 | 1.1255 | 1.1699 | 1.2155 | 1.2625 | 1.3108 | 1.3605 | 1.4116 | 1.4641 | 1.5181 | 1.5735 | 1.6305 | 1.6890 | 1.7490 | 1.8106 | 1.8739 | 1.9388 | 2.0053 | 2.0736 |
| 5      | 1.0510 | 1.1041 | 1.1593 | 1.2167 | 1.2763 | 1.3382 | 1.4026 | 1.4693 | 1.5386 | 1.6105 | 1.6851 | 1.7623 | 1.8424 | 1.9254 | 2.0114 | 2.1003 | 2.1924 | 2.2878 | 2.3864 | 2.4883 |
| 6      | 1.0615 | 1.1262 | 1.1941 | 1.2653 | 1.3401 | 1.4185 | 1.5007 | 1.5869 | 1.6771 | 1.7716 | 1.8704 | 1.9738 | 2.0820 | 2.1950 | 2.3131 | 2.4364 | 2.5652 | 2.6996 | 2.8398 | 2.9860 |
| 7      | 1.0721 | 1.1487 | 1.2299 | 1.3159 | 1.4071 | 1.5036 | 1.6058 | 1.7138 | 1.8280 | 1.9487 | 2.0762 | 2.2107 | 2.3526 | 2.5023 | 2.6600 | 2.8262 | 3.0012 | 3.1855 | 3.3793 | 3.5832 |
| 8      | 1.0829 | 1.1717 | 1.2668 | 1.3686 | 1.4775 | 1.5938 | 1.7182 | 1.8509 | 1.9926 | 2.1436 | 2.3045 | 2.4760 | 2.6584 | 2.8526 | 3.0590 | 3.2784 | 3.5115 | 3.7589 | 4.0214 | 4.2998 |
| 9      | 1.0937 | 1.1951 | 1.3048 | 1.4233 | 1.5513 | 1.6895 | 1.8385 | 1.9990 | 2.1719 | 2.3579 | 2.5580 | 2.7731 | 3.0040 | 3.2519 | 3.5179 | 3.8030 | 4.1084 | 4.4355 | 4.7854 | 5.1598 |
| 10     | 1.1046 | 1.2190 | 1.3439 | 1.4802 | 1.6289 | 1.7908 | 1.9672 | 2.1589 | 2.3674 | 2.5937 | 2.8394 | 3.1058 | 3.3946 | 3.7072 | 4.0456 | 4.4114 | 4.8068 | 5.2338 | 5.6947 | 6.1917 |
| 11     | 1.1157 | 1.2434 | 1.3842 | 1.5395 | 1.7103 | 1.8983 | 2.1049 | 2.3316 | 2.5804 | 2.8531 | 3.1518 | 3.4785 | 3.8359 | 4.2262 | 4.6524 | 5.1173 | 5.6240 | 6.1759 | 6.7767 | 7.4301 |
| 12     | 1.1268 | 1.2682 | 1.4258 | 1.5010 | 1.7959 | 2.0122 | 2.2522 | 2.5182 | 2.8127 | 3.1384 | 3.4985 | 3.8960 | 4.3345 | 4.8179 | 5.3503 | 5.9360 | 6.5801 | 7.2876 | 8.0642 | 8.9161 |
| 13     | 1.1381 | 1.2936 | 1.4685 | 1.6551 | 1.8856 | 2.1329 | 2.4098 | 2.7196 | 3.0658 | 3.4523 | 3.8833 | 4.3635 | 4.8980 | 5.4924 | 6.1528 | 6.8858 | 7.6987 | 8.5994 | 9.5964 | 10.699 |
| 14     | 1.1495 | 1.3195 | 1.5126 | 1.7317 | 1.9799 | 2.2609 | 2.5785 | 2.9372 | 3.3417 | 3.7975 | 4.3104 | 4.8871 | 5.5348 | 6.2613 | 7.0757 | 7.9875 | 9.0075 | 10.147 | 11.420 | 12.839 |
| 15     | 1.1610 | 1.3459 | 1.5580 | 1.8009 | 2.0789 | 2.3966 | 2.7590 | 3.1722 | 3.6425 | 4.1772 | 4.7846 | 5.4736 | 6.2543 | 7.1379 | 8.1371 | 9.2655 | 10.539 | 11.974 | 13.590 | 15.407 |
| 16     | 1.1726 | 1.3728 | 1.6047 | 1.8730 | 2.1829 | 2.5404 | 2.9522 | 3.4259 | 3.9703 | 4.5950 | 5.3109 | 6.1304 | 7.0673 | 8.1372 | 9.3576 | 10.748 | 12.330 | 14.129 | 16.172 | 18.488 |
| 17     | 1.1843 | 1.4002 | 1.6528 | 1.9479 | 2.2920 | 2.6928 | 3.1588 | 3.7000 | 4.3276 | 5.0545 | 5.8951 | 6.8660 | 7.9861 | 9.2765 | 10.761 | 12.468 | 14.426 | 16.672 | 19.244 | 22.186 |
| 18     | 1.1961 | 1.4282 | 1.7024 | 2.0258 | 2.4066 | 2.8543 | 3.3799 | 3.9960 | 4.7171 | 5.5599 | 6.5436 | 7.6900 | 9.0243 | 10.575 | 12.375 | 14.463 | 16.879 | 19.673 | 22.901 | 26.623 |
| 19     | 1.2081 | 1.4568 | 1.7535 | 2.1068 | 2.5270 | 3.0256 | 3.6165 | 4.3157 | 5.1417 | 6.1159 | 7.2633 | 8.6128 | 10.197 | 12.056 | 14.232 | 16.777 | 19.748 | 23.214 | 27.252 | 31.948 |
| 20     | 1.2202 | 1.4859 | 1.8061 | 2.1911 | 2.6533 | 3.2071 | 3.8697 | 4.6610 | 5.6044 | 6.7275 | 8.0623 | 9.6463 | 11.523 | 13.743 | 16.367 | 19.461 | 23.106 | 27.393 | 32.429 | 38.338 |
| 25     | 1.2824 | 1.6406 | 2.0938 | 2.6658 | 3.3864 | 4.2919 | 5.4274 | 6.8485 | 8.6231 | 10.835 | 13.585 | 17.000 | 21.231 | 26.462 | 32.919 | 40.874 | 50.658 | 62.669 | 77.388 | 95.396 |
| 30     | 1.3478 | 1.8114 | 2.4273 | 3.1434 | 4.3219 | 5.7435 | 7.6123 | 10.063 | 13.268 | 17.449 | 22.892 | 29.960 | 39.116 | 50.950 | 66.212 | 85.850 | 111.06 | 143.37 | 184.68 | 237.38 |
| 40     | 1.4889 | 2.2080 | 3.2620 | 4.7010 | 7.0409 | 10.286 | 14.974 | 21.725 | 31.409 | 45.259 | 65.001 | 93.051 | 132.78 | 188.88 | 267.86 | 378.72 | 533.87 | 730.38 | 1051.7 | 1469.8 |
| 50     | 1.6446 | 2.6916 | 4.3839 | 7.1067 | 11.467 | 18.420 | 29.457 | 46.902 | 74.358 | 117.39 | 184.56 | 289.00 | 450.74 | 700.23 | 1083.7 | 1670.7 | 2566.2 | 3927.4 | 5988.9 | 9100.4 |
| 60     | 1.8167 | 3.2810 | 5.8916 | 10.520 | 18.673 | 32.988 | 57.946 | 101.26 | 176.03 | 304.48 | 524.06 | 897.60 | 1530.1 | 2595.9 | 4384.0 | 7370.2 | 12335. | 20555. | 34105. | 56348. |

LAMPIRAN B

Table A.3 ■ Future value of a regular annuity of \$1 per period for n periods:  $FVFA(k, n) = \sum_{t=1}^n (1+k)^{n-t} = \frac{(1+k)^n - 1}{k}$

| Number of periods | Interest Rate (%) |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
|-------------------|-------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|                   | 1%                | 2%     | 3%     | 4%     | 5%     | 6%     | 7%     | 8%     | 9%     | 10%    | 11%    | 12%    | 13%    | 14%    | 15%    | 16%    | 17%    | 18%    | 19%    | 20%    |
| 1                 | 1.0000            | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 2                 | 2.0100            | 2.0200 | 2.0300 | 2.0400 | 2.0500 | 2.0600 | 2.0700 | 2.0800 | 2.0900 | 2.1000 | 2.1100 | 2.1200 | 2.1300 | 2.1400 | 2.1500 | 2.1600 | 2.1700 | 2.1800 | 2.1900 | 2.2000 |
| 3                 | 3.0301            | 3.0604 | 3.0909 | 3.1216 | 3.1525 | 3.1836 | 3.2149 | 3.2464 | 3.2781 | 3.3100 | 3.3421 | 3.3744 | 3.4069 | 3.4396 | 3.4725 | 3.5056 | 3.5389 | 3.5724 | 3.6061 | 3.6400 |
| 4                 | 4.0604            | 4.1216 | 4.1836 | 4.2465 | 4.3101 | 4.3746 | 4.4399 | 4.5061 | 4.5731 | 4.6410 | 4.7097 | 4.7793 | 4.8498 | 4.9211 | 4.9934 | 5.0675 | 5.1405 | 5.2154 | 5.2913 | 5.3684 |
| 5                 | 5.1010            | 5.2040 | 5.3091 | 5.4163 | 5.5256 | 5.6371 | 5.7507 | 5.8666 | 5.9847 | 6.1051 | 6.2278 | 6.3528 | 6.4803 | 6.6101 | 6.7424 | 6.8771 | 7.0144 | 7.1542 | 7.2966 | 7.4411 |
| 6                 | 6.1520            | 6.3081 | 6.4684 | 6.6330 | 6.8019 | 6.9753 | 7.1533 | 7.3359 | 7.5233 | 7.7156 | 7.9129 | 8.1152 | 8.3227 | 8.5355 | 8.7537 | 8.9775 | 9.2068 | 9.4420 | 9.6830 | 9.9299 |
| 7                 | 7.2135            | 7.4343 | 7.6625 | 7.8983 | 8.1420 | 8.3938 | 8.6540 | 8.9228 | 9.2004 | 9.4872 | 9.7833 | 10.089 | 10.405 | 10.730 | 11.067 | 11.414 | 11.772 | 12.142 | 12.523 | 12.911 |
| 8                 | 8.2857            | 8.5830 | 8.8923 | 9.2142 | 9.5491 | 9.8975 | 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 | 16.491 |
| 9                 | 9.3685            | 9.7546 | 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 | 17.519 | 18.285 | 19.086 | 19.923 | 20.791 |
| 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 | 23.045 | 24.349 | 25.733 | 27.200 | 28.755 | 30.404 | 32.150 |
| 12                | 12.683            | 13.412 | 14.192 | 15.026 | 15.917 | 16.870 | 17.888 | 18.977 | 20.141 | 21.384 | 22.713 | 24.133 | 25.640 | 27.227 | 28.902 | 30.680 | 32.524 | 34.931 | 37.180 | 39.581 |
| 13                | 13.809            | 14.680 | 15.618 | 16.627 | 17.713 | 18.882 | 20.141 | 21.495 | 22.953 | 24.523 | 26.212 | 28.029 | 29.955 | 32.089 | 34.352 | 36.786 | 39.404 | 42.219 | 45.244 | 48.497 |
| 14                | 14.947            | 15.974 | 17.086 | 18.292 | 19.599 | 21.015 | 22.550 | 24.215 | 26.019 | 27.975 | 30.095 | 32.393 | 34.833 | 37.581 | 40.505 | 43.672 | 47.103 | 50.818 | 54.841 | 59.196 |
| 15                | 16.097            | 17.293 | 18.599 | 20.024 | 21.579 | 23.276 | 25.129 | 27.152 | 29.361 | 31.772 | 34.405 | 37.280 | 40.417 | 43.842 | 47.580 | 51.660 | 56.110 | 60.965 | 66.261 | 72.035 |
| 16                | 17.258            | 18.639 | 20.157 | 21.825 | 23.657 | 25.673 | 27.888 | 30.324 | 33.003 | 35.950 | 39.190 | 42.753 | 46.672 | 50.900 | 55.717 | 60.925 | 66.649 | 72.939 | 79.850 | 87.442 |
| 17                | 18.430            | 20.012 | 21.762 | 23.698 | 25.840 | 28.213 | 30.840 | 33.750 | 36.974 | 40.545 | 44.501 | 48.884 | 53.719 | 59.118 | 65.075 | 71.673 | 78.979 | 87.088 | 96.022 | 105.93 |
| 18                | 19.615            | 21.412 | 23.414 | 25.645 | 28.132 | 30.906 | 33.999 | 37.450 | 41.301 | 45.599 | 50.396 | 55.750 | 61.755 | 68.394 | 75.836 | 84.141 | 93.406 | 103.74 | 115.27 | 128.12 |
| 19                | 20.811            | 22.841 | 25.117 | 27.671 | 30.539 | 33.760 | 37.379 | 41.446 | 46.018 | 51.159 | 56.939 | 63.440 | 70.749 | 78.969 | 88.212 | 98.603 | 110.28 | 123.41 | 138.17 | 154.74 |
| 20                | 22.019            | 24.297 | 26.870 | 29.778 | 33.066 | 36.786 | 40.995 | 45.762 | 51.160 | 57.275 | 64.203 | 72.052 | 80.547 | 91.025 | 102.44 | 115.38 | 130.03 | 146.63 | 165.42 | 186.69 |
| 25                | 28.243            | 32.030 | 36.459 | 41.646 | 47.727 | 54.865 | 63.249 | 73.106 | 84.701 | 98.347 | 114.41 | 133.33 | 155.32 | 181.87 | 212.79 | 249.21 | 292.10 | 342.60 | 402.04 | 471.98 |
| 30                | 34.785            | 40.568 | 47.575 | 56.085 | 66.439 | 79.058 | 94.461 | 113.28 | 136.31 | 164.49 | 199.02 | 241.33 | 293.20 | 356.79 | 434.75 | 530.31 | 647.44 | 790.95 | 966.71 | 1181.9 |
| 40                | 48.886            | 60.402 | 75.401 | 95.026 | 120.80 | 154.76 | 199.64 | 259.06 | 337.88 | 442.59 | 581.83 | 767.09 | 1011.7 | 1342.0 | 1779.1 | 2360.8 | 3134.5 | 4163.2 | 5529.8 | 7343.9 |
| 50                | 64.463            | 84.579 | 112.80 | 152.67 | 209.35 | 290.34 | 406.53 | 573.77 | 815.08 | 1163.9 | 1668.8 | 2400.0 | 3451.5 | 4994.5 | 7217.7 | 10436. | 15089. | 21813. | 31515. | 45497. |
| 60                | 81.700            | 114.05 | 163.05 | 237.99 | 353.58 | 533.13 | 813.52 | 1253.2 | 1944.8 | 3034.8 | 4755.1 | 7471.6 | 11712. | 18535. | 29220. | 46058. | 72555. | *      | *      | *      |

The factor is greater than 99,999.

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Table A.2 Present value of \$1:  $PVF(k, n) = \frac{1}{(1+k)^n}$

| Period | 1%    | 2%    | 3%    | 4%    | 5%    | 6%    | 7%    | 8%    | 9%    | 10%   | 11%   | 12%   | 13%   | 14%   | 15%   | 16%   | 17%   | 18%   | 19%   | 20%   | 25%   |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1      | .9901 | .9804 | .9709 | .9615 | .9524 | .9434 | .9346 | .9259 | .9174 | .9091 | .9009 | .8929 | .8850 | .8772 | .8696 | .8621 | .8547 | .8475 | .8403 | .8333 | .8000 |
| 2      | .9803 | .9612 | .9426 | .9246 | .9070 | .8900 | .8734 | .8573 | .8417 | .8264 | .8116 | .7972 | .7831 | .7695 | .7561 | .7432 | .7305 | .7182 | .7062 | .6944 | .6400 |
| 3      | .9706 | .9423 | .9151 | .8890 | .8638 | .8396 | .8163 | .7938 | .7722 | .7513 | .7312 | .7118 | .6934 | .6750 | .6575 | .6407 | .6244 | .6086 | .5934 | .5787 | .5120 |
| 4      | .9610 | .9238 | .8885 | .8548 | .8227 | .7921 | .7629 | .7350 | .7084 | .6830 | .6587 | .6355 | .6133 | .5921 | .5718 | .5523 | .5337 | .5158 | .4987 | .4823 | .4096 |
| 5      | .9515 | .9057 | .8626 | .8219 | .7835 | .7473 | .7130 | .6806 | .6499 | .6209 | .5935 | .5674 | .5428 | .5194 | .4972 | .4761 | .4561 | .4371 | .4190 | .4019 | .3277 |
| 6      | .9420 | .8880 | .8375 | .7903 | .7462 | .7050 | .6663 | .6302 | .5963 | .5645 | .5346 | .5066 | .4803 | .4556 | .4323 | .4104 | .3898 | .3704 | .3521 | .3349 | .2621 |
| 7      | .9327 | .8706 | .8131 | .7599 | .7107 | .6651 | .6227 | .5835 | .5470 | .5132 | .4817 | .4523 | .4251 | .3996 | .3759 | .3538 | .3332 | .3139 | .2959 | .2791 | .2097 |
| 8      | .9235 | .8535 | .7894 | .7307 | .6768 | .6274 | .5820 | .5403 | .5019 | .4665 | .4339 | .4039 | .3762 | .3506 | .3269 | .3050 | .2848 | .2660 | .2487 | .2326 | .1678 |
| 9      | .9143 | .8368 | .7664 | .7026 | .6446 | .5919 | .5439 | .5002 | .4604 | .4241 | .3909 | .3606 | .3329 | .3075 | .2843 | .2630 | .2434 | .2255 | .2090 | .1938 | .1342 |
| 10     | .9053 | .8203 | .7441 | .6756 | .6139 | .5584 | .5083 | .4632 | .4224 | .3855 | .3522 | .3220 | .2946 | .2697 | .2472 | .2267 | .2080 | .1911 | .1756 | .1615 | .1074 |
| 11     | .8963 | .8043 | .7224 | .6496 | .5847 | .5268 | .4751 | .4289 | .3875 | .3505 | .3173 | .2875 | .2607 | .2366 | .2149 | .1954 | .1778 | .1619 | .1476 | .1346 | .0859 |
| 12     | .8874 | .7885 | .7014 | .6246 | .5568 | .4970 | .4440 | .3971 | .3555 | .3186 | .2858 | .2567 | .2307 | .2076 | .1869 | .1685 | .1520 | .1372 | .1240 | .1122 | .0687 |
| 13     | .8787 | .7730 | .6810 | .6006 | .5303 | .4688 | .4150 | .3677 | .3262 | .2897 | .2575 | .2292 | .2042 | .1821 | .1625 | .1452 | .1299 | .1163 | .1042 | .0935 | .0550 |
| 14     | .8700 | .7579 | .6611 | .5775 | .5051 | .4423 | .3878 | .3405 | .2992 | .2633 | .2320 | .2046 | .1807 | .1597 | .1413 | .1252 | .1110 | .0985 | .0876 | .0779 | .0440 |
| 15     | .8613 | .7430 | .6419 | .5553 | .4810 | .4173 | .3624 | .3152 | .2745 | .2394 | .2090 | .1827 | .1599 | .1401 | .1229 | .1079 | .0949 | .0835 | .0736 | .0649 | .0352 |
| 16     | .8528 | .7284 | .6232 | .5339 | .4581 | .3936 | .3387 | .2919 | .2519 | .2176 | .1883 | .1631 | .1415 | .1229 | .1069 | .0930 | .0811 | .0708 | .0618 | .0541 | .0281 |
| 17     | .8444 | .7142 | .6050 | .5134 | .4363 | .3714 | .3166 | .2703 | .2311 | .1978 | .1696 | .1456 | .1252 | .1078 | .0929 | .0802 | .0693 | .0600 | .0520 | .0451 | .0225 |
| 18     | .8360 | .7002 | .5874 | .4936 | .4155 | .3503 | .2959 | .2502 | .2120 | .1799 | .1528 | .1300 | .1108 | .0946 | .0808 | .0691 | .0592 | .0508 | .0437 | .0376 | .0180 |
| 19     | .8277 | .6864 | .5703 | .4746 | .3957 | .3305 | .2765 | .2317 | .1945 | .1635 | .1377 | .1161 | .0981 | .0829 | .0703 | .0596 | .0506 | .0431 | .0367 | .0313 | .0144 |
| 20     | .8195 | .6730 | .5537 | .4564 | .3769 | .3118 | .2584 | .2145 | .1784 | .1486 | .1240 | .1037 | .0868 | .0728 | .0611 | .0514 | .0433 | .0365 | .0308 | .0261 | .0115 |
| 25     | .7798 | .6095 | .4776 | .3751 | .2953 | .2330 | .1842 | .1460 | .1160 | .0923 | .0736 | .0588 | .0471 | .0378 | .0304 | .0245 | .0197 | .0160 | .0129 | .0105 | .0038 |
| 30     | .7419 | .5521 | .4120 | .3083 | .2314 | .1741 | .1314 | .0994 | .0754 | .0573 | .0437 | .0334 | .0256 | .0196 | .0151 | .0116 | .0090 | .0070 | .0054 | .0042 | .0012 |
| 40     | .6717 | .4524 | .3066 | .2083 | .1420 | .0972 | .0668 | .0460 | .0318 | .0221 | .0154 | .0107 | .0075 | .0053 | .0037 | .0026 | .0019 | .0013 | .0010 | .0007 | .0001 |
| 50     | .6080 | .3715 | .2281 | .1407 | .0872 | .0543 | .0339 | .0213 | .0134 | .0085 | .0054 | .0035 | .0022 | .0014 | .0009 | .0006 | .0004 | .0003 | .0002 | .0001 | .0001 |
| 60     | .5504 | .304E | .1697 | .0951 | .0535 | .0303 | .0173 | .0099 | .0057 | .0033 | .0019 | .0011 | .0007 | .0004 | .0002 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 |

\* The factor is zero to four decimal places.

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Table A.4. Present value of a regular annuity of \$1 per period for n periods:  $PVFA(k, n) = \sum_{t=1}^n \frac{1}{(1+k)^t} = \frac{1 - \frac{1}{(1+k)^n}}{k}$

| Number of periods | 1%      | 2%      | 3%      | 4%      | 5%      | 6%      | 7%      | 8%      | 9%      | 10%    | 11%    | 12%    | 13%    | 14%    | 15%    | 16%    | 17%    | 18%    | 19%    | 20%    |
|-------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1                 | 0.9901  | 0.9804  | 0.9709  | 0.9615  | 0.9524  | 0.9434  | 0.9346  | 0.9259  | 0.9174  | 0.9091 | 0.9009 | 0.8929 | 0.8850 | 0.8772 | 0.8696 | 0.8621 | 0.8547 | 0.8475 | 0.8403 | 0.8333 |
| 2                 | 1.9704  | 1.9416  | 1.9135  | 1.8861  | 1.8594  | 1.8334  | 1.8080  | 1.7833  | 1.7591  | 1.7355 | 1.7125 | 1.6901 | 1.6681 | 1.6467 | 1.6257 | 1.6052 | 1.5852 | 1.5656 | 1.5465 | 1.5278 |
| 3                 | 2.9410  | 2.8839  | 2.8286  | 2.7751  | 2.7232  | 2.6730  | 2.6243  | 2.5771  | 2.5313  | 2.4869 | 2.4437 | 2.4018 | 2.3612 | 2.3216 | 2.2832 | 2.2459 | 2.2096 | 2.1743 | 2.1399 | 2.1065 |
| 4                 | 3.9020  | 3.8077  | 3.7171  | 3.6299  | 3.5460  | 3.4651  | 3.3872  | 3.3121  | 3.2397  | 3.1699 | 3.1024 | 3.0373 | 2.9745 | 2.9137 | 2.8550 | 2.7982 | 2.7432 | 2.6901 | 2.6386 | 2.5887 |
| 5                 | 4.8534  | 4.7135  | 4.5797  | 4.4518  | 4.3295  | 4.2124  | 4.1002  | 3.9927  | 3.8897  | 3.7908 | 3.6959 | 3.6048 | 3.5172 | 3.4331 | 3.3522 | 3.2743 | 3.1993 | 3.1272 | 3.0576 | 2.9906 |
| 6                 | 5.7955  | 5.6014  | 5.4172  | 5.2421  | 5.0757  | 4.9173  | 4.7665  | 4.6229  | 4.4859  | 4.3553 | 4.2305 | 4.1114 | 3.9976 | 3.8887 | 3.7845 | 3.6847 | 3.5892 | 3.4976 | 3.4098 | 3.3255 |
| 7                 | 6.7282  | 6.4720  | 6.2303  | 6.0021  | 5.7864  | 5.5824  | 5.3893  | 5.2064  | 5.0330  | 4.8684 | 4.7122 | 4.5638 | 4.4226 | 4.2883 | 4.1604 | 4.0386 | 3.9224 | 3.8115 | 3.7057 | 3.6046 |
| 8                 | 7.6517  | 7.3255  | 7.0197  | 6.7327  | 6.4632  | 6.2098  | 5.9713  | 5.7466  | 5.5348  | 5.3349 | 5.1461 | 4.9676 | 4.7988 | 4.6389 | 4.4873 | 4.3436 | 4.2072 | 4.0776 | 3.9544 | 3.8372 |
| 9                 | 8.5660  | 8.1622  | 7.7861  | 7.4353  | 7.1078  | 6.8017  | 6.5152  | 6.2469  | 5.9952  | 5.7590 | 5.5370 | 5.3282 | 5.1317 | 4.9464 | 4.7716 | 4.6055 | 4.4480 | 4.3000 | 4.1613 | 4.0310 |
| 10                | 9.4713  | 8.9826  | 8.5302  | 8.1109  | 7.7217  | 7.3601  | 7.0236  | 6.7101  | 6.4177  | 6.1446 | 5.8912 | 5.6502 | 5.4262 | 5.2161 | 5.0188 | 4.8332 | 4.6586 | 4.4941 | 4.3389 | 4.1925 |
| 11                | 10.3676 | 9.7868  | 9.2526  | 8.7635  | 8.3064  | 7.8869  | 7.4987  | 7.1390  | 6.8052  | 6.4951 | 6.2065 | 5.9377 | 5.6869 | 5.4527 | 5.2337 | 5.0286 | 4.8364 | 4.6560 | 4.4865 | 4.3271 |
| 12                | 11.2551 | 10.5753 | 9.9540  | 9.3851  | 8.8633  | 8.3838  | 7.9427  | 7.5361  | 7.1607  | 6.8137 | 6.4924 | 6.1944 | 5.9176 | 5.6603 | 5.4206 | 5.1971 | 4.9884 | 4.7932 | 4.6105 | 4.4392 |
| 13                | 12.1337 | 11.3484 | 10.6350 | 9.9856  | 9.3936  | 8.8527  | 8.3577  | 7.9038  | 7.4869  | 7.1034 | 6.7499 | 6.4235 | 6.1218 | 5.8424 | 5.5831 | 5.3423 | 5.1183 | 4.9095 | 4.7147 | 4.5327 |
| 14                | 13.0037 | 12.1062 | 11.2961 | 10.5631 | 9.8986  | 9.2950  | 8.7455  | 8.2442  | 7.7862  | 7.3667 | 6.9819 | 6.6282 | 6.3025 | 6.0021 | 5.7245 | 5.4675 | 5.2293 | 5.0081 | 4.8023 | 4.6106 |
| 15                | 13.8651 | 12.8493 | 11.9379 | 11.1184 | 10.3797 | 9.7122  | 9.1079  | 8.5595  | 8.0607  | 7.6061 | 7.1909 | 6.8109 | 6.4624 | 6.1422 | 5.8474 | 5.5755 | 5.3242 | 5.0916 | 4.8759 | 4.6755 |
| 16                | 14.7179 | 13.5777 | 12.5611 | 11.6523 | 10.8378 | 10.1059 | 9.4466  | 8.8514  | 8.3126  | 7.8237 | 7.3792 | 6.9740 | 6.6039 | 6.2651 | 5.9542 | 5.6685 | 5.4053 | 5.1624 | 4.9377 | 4.7296 |
| 17                | 15.5623 | 14.2919 | 13.1661 | 12.1657 | 11.2741 | 10.4773 | 9.7632  | 9.1216  | 8.5436  | 8.0216 | 7.5488 | 7.1196 | 6.7291 | 6.3729 | 6.0472 | 5.7487 | 5.4746 | 5.2223 | 4.9987 | 4.7746 |
| 18                | 16.3983 | 14.9920 | 13.7535 | 12.6593 | 11.6896 | 10.8276 | 10.0591 | 9.3719  | 8.7556  | 8.2014 | 7.7016 | 7.2497 | 6.8399 | 6.4674 | 6.1280 | 5.8178 | 5.5339 | 5.2732 | 5.0333 | 4.8122 |
| 19                | 17.2260 | 15.6785 | 14.3238 | 13.1339 | 12.0853 | 11.1581 | 10.3356 | 9.6036  | 8.9501  | 8.3649 | 7.8393 | 7.3658 | 6.9300 | 6.5304 | 6.1592 | 5.8175 | 5.5045 | 5.2162 | 4.9435 | 4.6833 |
| 20                | 18.0456 | 16.3514 | 14.8775 | 13.5903 | 12.4622 | 11.4699 | 10.5940 | 9.8181  | 9.1285  | 8.5136 | 7.9633 | 7.4694 | 7.0248 | 6.6231 | 6.2593 | 5.9288 | 5.6278 | 5.3527 | 5.1009 | 4.8696 |
| 25                | 22.0232 | 19.5235 | 17.4131 | 15.6221 | 14.0939 | 12.7834 | 11.6536 | 10.6748 | 9.8226  | 9.0770 | 8.4217 | 7.8431 | 7.3300 | 6.8729 | 6.4641 | 6.0971 | 5.7662 | 5.4669 | 5.1951 | 4.9476 |
| 30                | 25.8027 | 22.3965 | 19.6004 | 17.2920 | 15.3725 | 13.7648 | 12.4090 | 11.2578 | 10.2732 | 9.4269 | 8.6938 | 8.0532 | 7.4947 | 7.0027 | 6.5660 | 6.1772 | 5.8294 | 5.5168 | 5.2347 | 4.9789 |
| 40                | 32.8347 | 27.3555 | 23.1148 | 19.7928 | 17.1591 | 15.0463 | 13.3317 | 11.9246 | 10.7574 | 9.7791 | 8.9511 | 8.2438 | 7.6344 | 7.1050 | 6.6418 | 6.2335 | 5.8713 | 5.5482 | 5.2582 | 4.9966 |
| 50                | 39.1961 | 31.4236 | 25.7298 | 21.4822 | 18.2559 | 15.7619 | 13.8007 | 12.2335 | 10.9617 | 9.9148 | 9.0417 | 8.3045 | 7.6752 | 7.1327 | 6.6605 | 6.2463 | 5.8801 | 5.5541 | 5.2623 | 4.9995 |
| 60                | 44.9550 | 34.7609 | 27.6756 | 22.6235 | 18.9293 | 16.1614 | 14.0392 | 12.3766 | 11.0480 | 9.9672 | 9.0736 | 8.3240 | 7.6873 | 7.1401 | 6.6651 | 6.2402 | 5.8819 | 5.5553 | 5.2630 | 4.9999 |

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