

# UNIVERSITI SAINS MALAYSIA

## Peperiksaan Semester Pertama

Sidang 1993/94

Oktober - November 1993

### AKP 300 - 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 **SEMUA** soalan dari Bahagian A. Jawab **EMPAT** soalan dari Bahagian B dan **TIGA** soalan dari Bahagian C.

#### BAHAGIAN A

Jawab **SEMUA** soalan.

1. Pengurus BRD Motors sedang mempertimbangkan empat peluang pelaburan yang berikut untuk tempoh perancangan akan datang ini:

| <u>Projek</u> | <u>Kos</u> | <u>KPD (IRR)</u> |
|---------------|------------|------------------|
| A             | RM10 juta  | 9 %              |
| B             | RM18 juta  | 11 %             |
| C             | RM15 juta  | 15 %             |
| D             | RM12 juta  | 12 %             |

Syarikat menjangkakan pendapatan berjumlah RM18 juta akan didapati untuk tempoh tersebut. Pada tahun-tahun yang lalu, nisbah pembayaran dividennya ialah 50% tetapi untuk tahun ini, pihak pengurus sedang memikir hendak mengubah dasar ini.

Kadar cukai syarikat ialah 40% dan struktur modalnya ialah 40% hutang dan 60% saham biasa. Dianggapkan bahawa struktur modal ini adalah optimal.

Harga jualan semasa saham biasa syarikat ialah RM60 dan kadar pulangan dikehendakinya ialah 17%. Bon yang baru boleh dijual pada nilai tara dengan kadar kupon 7%. Kos pengapongan ke atas saham biasa barunya ialah RM7 sesyer. Pertumbuhan pendapatan dan dividen dijangka mantap di masa akan datang. Pelabur menjangka syarikat akan membayar dividen sebanyak RM5.10 untuk tempoh akan datang ( $D_1$ ).

...2/-

- (a) (i) Apakah kos modal (WACC) sekiranya perolehan tertahan digunakan? Apakah kos modal sekiranya saham baru dikeluarkan. Apakah titik pecahan di mana kos modal akan meningkat?
- (ii) Apakah tahap belanjawan modal yang optimal? Projek manakah harus diterima?
- (b) Sekiranya syarikat membayar dividen berasaskan dasar lebihan,
  - (i) projek manakah harus diterima dan apakah belanjawan modal yang optimal?
  - (ii) bagaimanakah belanjawan modal itu akan dibiayai dan berapakah amaun pendapatan yang akan dibayar sebagai dividen?

[15 markah]

2. Jumlah nilai pasaran (V), Syarikat UBI ialah RM 200 juta yang terdiri daripada 2 juta syer saham biasa yang sedang diperjuangkan pada harga RM 50 sesyer dan RM 100 juta bon berterusan (perpetual) pada 10% yang sekarang dijual pada nilai tara. UBI mengeluarkan semua pendapatannya sebagai dividen. Kadar cukainya ialah 40%. Pendapatan sebelum bunga dan cukai (EBIT) ialah RM 30 juta. Pihak pengurus ingin meningkatkan jumlah hutang ke RM 140 juta dengan membuat panggilan ke atas semua bon lamanya dan mengeluarkan bon baru pada kadar kupon 12% dan menjualnya pada nilai tara. Penambahan pada keumpilan kewangan syarikat akan meningkatkan kadar pulangan dikehendaki ke atas ekuiti kepada 15%.

Gunakan formula Hamada, antaranya:

$$V = S + D$$

$$S = \frac{(EBIT - k_d D) (1 - T)}{K_s}$$

$$P_1 = \frac{V_1 - D_0}{n_0}$$

- (a) Apakah kadar pulangan dikehendaki semasa ke atas ekuiti Syarikat?
- (b) Apakah nilai firma sekiranya perubahan struktur modal dibuat.
- (c) Andaikan bahawa dengan penukaran struktur modalnya, nilai firma menjadi RM 204 juta. Apakah harga baru sahamnya?

- (d) Andaikan pula UBI tidak akan memanggil kembali hutang semasanya sebanyak RM 100 juta. Kos untuk mendapat RM 40 juta modal tambahan kekal pada 12% (sebelum cukai) dan tambahan beban hutang ini menambahkan kadar pulangan dikehendaki ke atas hutangnya kepada 11%. Apakah amaun dividen yang dijangka dibayar sekiranya struktur modal diubahkan begini.

[15 markah]

**BAHAGIAN B**

Jawab EMPAT soalan sahaja.

3. Syarikat WW merupakan sebuah konglomerat besar yang akan memperolehi Syarikat XY. Dengan perolehan ini, diramalkan bahawa untuk 2 tahun akan datang syarikat akan mengalami pertumbuhan luar biasa sebanyak 20%, dan untuk 2 tahun berikutnya pertumbuhan adalah pada kadar 10% dan seterusnya pertumbuhannya akan mantap pada 6% setahun. Sekiranya dividen terakhirnya  $D_0 = RM1$  sesyer dan kadar pulangan dikehendaki ialah 8%, apakah seharusnya harga pasaran saham syarikat ini?

[10 markah]

4. (a) Daripada maklumat berikut, kirakan kadar pulangan dikehendaki untuk pelaburan Syarikat Sismax.

| <u>Saham</u> | <u>Pelaburan</u> | <u>Beta</u> |
|--------------|------------------|-------------|
| A            | RM 200,000       | 1.50        |
| B            | RM 300,000       | -0.50       |
| C            | RM 500,000       | 1.25        |
| D            | RM 1,000,000     | 0.75        |

Kadar pulangan pasaran ialah 15% dan kadar faedah tanpa risiko ialah 7%.

- (b) Anda telah membayarkan RM1,135.90 untuk bon yang akan matang di dalam masa 10 tahun. Bunga dibayar setiap 6 bulan. Sekiranya anda memerlukan kadar pulangan nominal sebanyak 8%, apakah kadar kupon ke atas bon ini?

[10 markah]

5. Syarikat RST ingin membeli mesin pemotong kayu untuk menggantikan mesin lamanya yang mempunyai nilai buku RM 3,000 dan boleh dijual pada harga RM 1,500. Mesin lama disusutnilaikan berdasarkan kaedah garis lurus dan nilai sisaan pada akhir tahun 3 yang akan datang ialah kosong. Mesin baru akan dapat mengurangkan kos (sebelum cukai) dengan amaun sebanyak RM 7,000 setahun. Mesin baru ini mempunyai usia kegunaan 3 tahun akan dibeli pada kos RM 14,000 dan dijangka boleh dijual pada harga RM 2,000 pada akhir tahun tiga. Kadar susutnilai tahunan mesin baru ialah: 0.33, 0.45, 0.15 dan 0.07. Sekiranya kadar cukai syarikat ialah 40% dan kos modal ialah 16%, kirakan nilai kini bersih (NKB) mesin ini.

[10 markah]

...4/-

6. Dua projek, A dan B sedang dipertimbangkan untuk pelaburan. Kos setiap projek ialah RM 10,000 dan kos modal ialah 12%. Berikut ialah aliran tunai bersih yang dijangka daripada projek tersebut:

| <u>Tahun</u> | <u>Projek A</u> | <u>Projek B</u> |
|--------------|-----------------|-----------------|
| 0            | (RM 10,000)     | (RM 10,000)     |
| 1            | 6,500           | 3,500           |
| 2            | 3,000           | 3,500           |
| 3            | 3,000           | 3,500           |
| 4            | 1,000           | 3,500           |

- (a) Kirakan nilai kini bersih (NKB), kadar pulangan dalaman (IRR) dan kadar pulangan dalaman diperbaiki (MIRR) untuk setiap projek.
- (b) Projek mana akan dipilih sekiranya perkaitan antara projek adalah bebas?
- (c) Projek mana akan dipilih sekiranya perkaitan adalah saling eksklusif?

[10 markah]

7. Berikut diberikan kunci kira-kira dan penyata pendapatan Syarikat NAMFAC:

Syarikat NAMFAC  
Kunci Kira-Kira  
seperti pada 31/12/90  
(RM'000)

|                   |                 |                           |                 |
|-------------------|-----------------|---------------------------|-----------------|
| Aset semasa       | RM15,000        | Hutang (7%)               | RM15,000        |
| Aset tetap bersih | RM15,000        | Saham Biasa (RM10 n.tara) | RM10,000        |
|                   |                 | Perolehan tertahan        | RM 5,000        |
| Jumlah aset       | <u>RM30,000</u> | Jumlah Liabiliti & Ekuiti | <u>RM30,000</u> |

Penyata Pendapatan  
Tahun Berakhir 31/12/90  
(RM'000)

|                                  |                          |
|----------------------------------|--------------------------|
| Jualan                           | RM45,000                 |
| Kos Barang Dijual                | 36,950                   |
| Pendapatan Sebelum Bunga & Cukai | <u>RM 8,050</u>          |
| Belanja Bunga                    | 1,050                    |
| Pendapatan Sebelum Cukai         | <u>RM 7,000</u>          |
| Cukai (40%)                      | 2,800                    |
| Pendapatan Bersih                | <u>RM 4,200</u><br>===== |

...5/-

Polisi syarikat ialah membayarkan 40% daripada pendapatan semasa dalam bentuk dividen. Kadar pertumbuhan tahunan syarikat adalah 5% dan ianya dijangka akan berterusan. Harga pasaran semasa saham biasa NAMFAC ialah 10 kali ganda pendapatan sesyer tahun 1989.

- (a) Apakah kadar pulangan dikehendaki oleh pelabur?
- (b) Sekiranya kadar pulangan yang dikehendaki oleh pelabur ialah 14%, apakah harga pasaran yang akan membuatkan anda melabur saham NAMFAC.
- (c) Sekiranya dijangka kadar pertumbuhan pendapatan dan dividen masa hadapannya akan meningkat ke 14% setahun dan kadar pulangan dikehendaki ialah 17%, apakah harga baru yang patut diberi pada saham ini?

[10 markah]

### BAHAGIAN C

Jawab **TIGA** soalan sahaja.

- 8.(a) Apakah yang dimaksudkan dengan konflik agensi? Bincangkan konflik agensi yang timbul antara ahli pemegang saham dan kreditor.
- (b) Haruskah pengurus Syarikat dibenarkan memiliki peratusan saham yang besar di dalam firma? Bincangkan kebaikan dan keburukannya.

[10 markah]

9. Bincangkan maksud/perkaitan antara frasa berikut:

- (a) risiko sistematik; risiko tidak sistematik.
- (b) lini kecirian; garis pasaran sekuriti.
- (c) sempadan yang cekap (efficient frontier).
- (d) keluk berkecuali.

[10 markah]

10. Terangkan secara ringkas, teori-teori struktur modal yang berikut:

- (a) Teori Modigliani-Miller tanpa cukai pendapatan.
- (b) Teori Modigliani-Miller dengan cukai pendapatan.
- (c) Model Miller.
- (d) Model penukaran struktur modal.

[10 markah]

...6/-

11. (a) Terangkan faktor-faktor yang mempengaruhi dasar dividen sesebuah syarikat.
- (b) Terangkan apa yang dimaksudkan dengan Teori Maklumat tidak Simetri. Apakah implikasinya ke atas keputusan struktur modal?

[10 markah]

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 | 4.8066 | 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 | 1.6651 | 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 | 2.6558 | 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      | 7.4414      |
| 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    | 10.0889   | 10.4045    | 10.7300    | 11.0671    | 11.4144    | 11.7722    | 12.1412     | 12.5212     | 12.9129     |
| 8                 | 8.2857            | 8.5830   | 8.8923   | 9.2142   | 9.5491   | 9.8975   | 10.2600  | 10.6377   | 11.0281   | 11.4336   | 11.8599   | 12.3000   | 12.7557    | 13.2333    | 13.7277    | 14.2400    | 14.7733    | 15.3277     | 15.9022     | 16.4979     |
| 9                 | 9.3685            | 9.7546   | 10.1599  | 10.5833  | 11.0277  | 11.4911  | 11.9788  | 12.4888   | 13.0211   | 13.5799   | 14.1664   | 14.7766   | 15.4116    | 16.0855    | 16.7866    | 17.5199    | 18.2885    | 19.0866     | 19.9223     | 20.7974     |
| 10                | 10.4622           | 10.9500  | 11.4664  | 12.0066  | 12.5778  | 13.1811  | 13.8166  | 14.4887   | 15.1933   | 15.9377   | 16.7222   | 17.5499   | 18.4220    | 19.3337    | 20.3004    | 21.3211    | 22.3933    | 23.5211     | 24.7099     | 25.9599     |
| 11                | 11.5672           | 12.1699  | 12.8088  | 13.4866  | 14.2077  | 14.9722  | 15.7844  | 16.6455   | 17.5600   | 18.5311   | 19.5611   | 20.6555   | 21.8144    | 23.0455    | 24.3499    | 25.7333    | 27.2000    | 28.7555     | 30.4000     | 32.1500     |
| 12                | 12.6883           | 13.4122  | 14.1922  | 15.0266  | 15.9177  | 16.8700  | 17.8888  | 18.9777   | 20.1411   | 21.3844   | 22.7133   | 24.1333   | 25.6477    | 27.2600    | 28.9733    | 30.7900    | 32.7200    | 34.7600     | 36.9100     | 39.1800     |
| 13                | 13.8099           | 14.6800  | 15.6188  | 16.6277  | 17.7133  | 18.8822  | 20.1411  | 21.4955   | 22.9533   | 24.5233   | 26.2122   | 28.0299   | 29.9833    | 32.0899    | 34.3522    | 36.7866    | 39.4044    | 42.2199     | 45.2444     | 48.4977     |
| 14                | 14.9477           | 15.9744  | 17.0866  | 18.2922  | 19.5999  | 21.0155  | 22.5500  | 24.2155   | 26.0199   | 27.9755   | 30.0955   | 32.3933   | 34.8833    | 37.5811    | 40.5055    | 43.6722    | 47.1033    | 50.8188     | 54.8411     | 59.1966     |
| 15                | 16.0977           | 17.2933  | 18.5999  | 20.0244  | 21.5799  | 23.2766  | 25.1299  | 27.1522   | 29.3611   | 31.7722   | 34.4055   | 37.2800   | 40.4177    | 43.8422    | 47.5800    | 51.6600    | 56.1100    | 60.9655     | 66.2611     | 72.0355     |
| 16                | 17.2588           | 18.6399  | 20.1577  | 21.8225  | 23.6577  | 25.6733  | 27.8888  | 30.3244   | 33.0033   | 35.9500   | 39.1900   | 42.7533   | 46.6722    | 50.9800    | 55.7177    | 60.9255    | 66.6499    | 72.9399     | 79.8500     | 87.4422     |
| 17                | 18.4300           | 20.0122  | 21.7622  | 23.6988  | 25.8400  | 28.2133  | 30.8400  | 33.7500   | 36.9744   | 40.5455   | 44.5011   | 48.8844   | 53.7399    | 59.1188    | 65.0755    | 71.6733    | 78.9799    | 87.0688     | 96.0222     | 105.9555    |
| 18                | 19.6155           | 21.4122  | 23.4144  | 25.6455  | 28.1332  | 30.9066  | 33.9999  | 37.4500   | 41.3011   | 45.5999   | 50.3966   | 55.7500   | 61.7255    | 68.3944    | 75.8366    | 84.1411    | 93.4066    | 103.7477    | 115.2777    | 128.1222    |
| 19                | 20.8111           | 22.8411  | 25.1177  | 27.6711  | 30.5399  | 33.7600  | 37.3799  | 41.4466   | 46.0188   | 51.1599   | 56.9399   | 63.4400   | 70.7299    | 78.9699    | 88.2122    | 98.6033    | 110.2888   | 123.4111    | 138.1777    | 154.7474    |
| 20                | 22.0199           | 24.2977  | 26.8700  | 29.7788  | 33.0066  | 36.7866  | 40.9955  | 45.7622   | 51.1600   | 57.2722   | 64.2033   | 72.0522   | 80.5477    | 91.0255    | 102.4444   | 115.3888   | 130.0333   | 146.6333    | 165.4222    | 186.6999    |
| 25                | 28.2433           | 32.0300  | 36.4599  | 41.6466  | 47.7277  | 54.8655  | 63.2499  | 73.1066   | 84.7011   | 98.3477   | 114.4111  | 133.3333  | 155.5222   | 181.8777   | 212.7999   | 249.2111   | 292.1000   | 342.6000    | 402.0444    | 471.9888    |
| 30                | 34.7885           | 40.5688  | 47.5755  | 56.0855  | 66.4399  | 79.0588  | 94.4611  | 113.2888  | 136.3111  | 164.4999  | 199.0222  | 241.3333  | 293.2000   | 356.7999   | 434.7555   | 530.3111   | 647.4444   | 790.9555    | 966.7111    | 1181.9999   |
| 40                | 48.8866           | 60.4022  | 75.4011  | 95.0266  | 120.8033 | 154.7666 | 199.6444 | 259.0666  | 337.8888  | 442.5999  | 581.8333  | 767.0999  | 1011.7777  | 1342.0000  | 1779.1111  | 2360.8888  | 3134.5555  | 4163.2222   | 5529.8888   | 7343.9999   |
| 50                | 64.4633           | 84.5799  | 112.8033 | 152.6777 | 209.3555 | 290.3444 | 406.5333 | 573.7777  | 815.0888  | 1163.9999 | 1668.8888 | 2430.0000 | 3451.5555  | 4994.5555  | 7217.7777  | 10436.6666 | 15089.9999 | 21813.3333  | 31515.5555  | 45997.7777  |
| 60                | 81.7000           | 114.0555 | 163.0555 | 237.9999 | 353.5888 | 533.1333 | 813.5222 | 1253.2222 | 1944.8888 | 3034.8888 | 4755.1111 | 7471.6666 | 11712.2222 | 18535.5555 | 29220.0000 | 46056.6666 | 72555.5555 | 111111.1111 | 171111.1111 | 255555.5555 |

\* The factor is greater than 99,999.



LAMPIRAN C

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 | .3339 | .3159 | .2997 | .2847 | .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 | .4521 | .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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LAMPIRAN D

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

| 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 | 2.3217 | 2.2832 | 2.2457 | 2.2092 | 2.1736 | 2.1390 | 2.1055 |
| 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 | 2.6900 | 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 | 3.6046 | 3.5172 | 3.4331 | 3.3522 | 3.2743 | 3.1993 | 3.1272 | 3.0576 | 2.9904 |
| 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 | 3.7847 | 3.6847 | 3.5887 | 3.4966 | 3.4075 | 3.3215 |
| 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  | 7.3355  | 7.0397  | 6.7632  | 6.5056  | 6.2663  | 6.0452  | 5.8426  | 5.6584  | 5.4929 | 5.3461 | 5.2076 | 5.0769 | 4.9535 | 4.8367 | 4.7267 | 4.6237 | 4.5270 | 4.4368 | 4.3522 |
| 9                 | 8.5660  | 8.1822  | 7.7861  | 7.4353  | 7.1078  | 6.8017  | 6.5162  | 6.2519  | 5.9982  | 5.7550 | 5.5320 | 5.3282 | 5.1437 | 4.9764 | 4.8257 | 4.6817 | 4.5446 | 4.4146 | 4.2918 | 4.1755 |
| 10                | 9.4713  | 8.9226  | 8.5302  | 8.1109  | 7.7217  | 7.3601  | 7.0236  | 6.7101  | 6.4177  | 6.1446 | 5.8892 | 5.6502 | 5.4262 | 5.2161 | 5.0188 | 4.8332 | 4.6586 | 4.4941 | 4.3399 | 4.1965 |
| 11                | 10.3676 | 9.7868  | 9.2526  | 8.7635  | 8.3064  | 7.8869  | 7.4987  | 7.1390  | 6.8052  | 6.4951 | 6.2085 | 5.9337 | 5.6699 | 5.4267 | 5.2037 | 5.0006 | 4.8064 | 4.6211 | 4.4457 | 4.2799 |
| 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 | 5.4226 | 5.1971 | 4.9844 | 4.7857 | 4.5918 | 4.4027 |
| 13                | 12.1337 | 11.3484 | 10.6350 | 9.9856  | 9.3936  | 8.8527  | 8.3577  | 7.9038  | 7.4869  | 7.1024 | 6.7489 | 6.4235 | 6.1258 | 5.8474 | 5.5874 | 5.3452 | 5.1197 | 4.9099 | 4.7058 | 4.5075 |
| 14                | 13.0037 | 12.1062 | 11.2961 | 10.5631 | 9.8986  | 9.2950  | 8.7455  | 8.2442  | 7.7862  | 7.3667 | 6.9819 | 6.6302 | 6.3025 | 6.0001 | 5.7245 | 5.4675 | 5.2283 | 5.0061 | 4.7923 | 4.5856 |
| 15                | 13.8651 | 12.8493 | 11.9379 | 11.1184 | 10.3797 | 9.7122  | 9.1079  | 8.5595  | 8.0607  | 7.6401 | 7.2509 | 6.8919 | 6.5624 | 6.2612 | 5.9874 | 5.7315 | 5.4928 | 5.2711 | 5.0573 | 4.8515 |
| 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 | 5.9582 | 5.6735 | 5.4103 | 5.1684 | 4.9377 | 4.7186 |
| 17                | 15.5623 | 14.2919 | 13.1661 | 12.1657 | 11.2741 | 10.4773 | 9.7632  | 9.1216  | 8.5436  | 8.0216 | 7.5408 | 7.1196 | 6.7329 | 6.3789 | 6.0567 | 5.7566 | 5.4784 | 5.2217 | 4.9864 | 4.7624 |
| 18                | 16.3983 | 14.9920 | 13.7535 | 12.6593 | 11.6696 | 10.8276 | 10.0591 | 9.3719  | 8.7556  | 8.2044 | 7.7016 | 7.2497 | 6.8399 | 6.4624 | 6.1180 | 5.8178 | 5.5399 | 5.2732 | 5.0283 | 4.7946 |
| 19                | 17.2269 | 15.6705 | 14.3238 | 13.1339 | 12.0853 | 11.1581 | 10.3356 | 9.6036  | 8.9501  | 8.3649 | 7.8393 | 7.3658 | 6.9300 | 6.5304 | 6.1582 | 5.8275 | 5.5285 | 5.2517 | 4.9968 | 4.7535 |
| 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 | 6.2533 | 5.9208 | 5.6228 | 5.3467 | 5.0918 | 4.8495 |
| 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 | 6.0921 | 5.7562 | 5.4569 | 5.1951 | 4.9607 |
| 30                | 25.8077 | 22.3865 | 19.6004 | 17.2920 | 15.3725 | 13.7648 | 12.4090 | 11.2578 | 10.2737 | 9.4289 | 8.6938 | 8.0552 | 7.4957 | 7.0027 | 6.5660 | 6.1772 | 5.8294 | 5.5168 | 5.2347 | 4.9809 |
| 40                | 32.8347 | 27.3535 | 23.1148 | 19.7928 | 17.1591 | 15.0463 | 13.3317 | 11.9746 | 10.7574 | 9.7791 | 8.9511 | 8.2438 | 7.6344 | 7.1050 | 6.6418 | 6.2335 | 5.8713 | 5.5482 | 5.2582 | 4.9965 |
| 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 | 7.6572 | 7.1327 | 6.6605 | 6.2463 | 5.8801 | 5.5541 | 5.2623 | 4.9995 |
| 60                | 44.9550 | 34.7609 | 27.6756 | 22.6335 | 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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