

SULIT

6



BAHAGIAN PEPERIKSAAN DAN PENILAIAN  
JABATAN PENDIDIKAN POLITEKNIK  
KEMENTERIAN PENDIDIKAN TINGGI

JABATAN PERDAGANGAN

PEPERIKSAAN AKHIR  
SESI JUN 2017

**DPB2033 : BUSINESS MATHEMATICS**

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**TARIKH : 30 OKTOBER 2017**  
**MASA : 8.30 PAGI - 10.30 PAGI (2 JAM)**

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Kertas ini mengandungi **LAPAN (8)** halaman bercetak.  
Struktur (4 soalan)

Dokumen sokongan yang disertakan : Jadual PVIF dan PVIFA

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**JANGAN BUKA KERTAS SOALANINI SEHINGGA DIARAHKAN**  
(CLO yang tertera hanya sebagai rujukan)

SULIT

**INSTRUCTION:**

This section consists of **FOUR (4)** structured questions. Answer **ALL** questions.

**ARAHAN:**

*Bahagian ini mengandungi **EMPAT (4)** soalan struktur. Jawab **SEMUA** soalan.*

**QUESTION 1****SOALAN 1**

CLO1  
C1

- a) Differentiate these equations:

*Bezakan persamaan berikut:*

i.  $y = (x^3 + 2)^{3/2}$

[5 marks]

[5 markah]

ii.  $y = \frac{3x^2+2x}{x^4+4x}$

[10 marks]

[10 markah]

CLO1  
C2

- b) The revenue function for firm A is  $R(x) = 35x - 0.03x^2$  and cost function is  $C(x) = 6000 + 5x$ .

*Diberi fungsi hasil firma A ialah  $R(x) = 35x - 0.03x^2$  manakala fungsi kos*

*$C(x) = 6000 + 5x$ .*

- i. Derive the profit function.

*Terbitkan fungsi untung.*

[3 marks]

[3 markah]

- ii. Determine the level of production in unit which will maximize the profit.

*Tentukan peringkat pengeluaran dalam unit yang dapat memaksimumkan keuntungan.*

[4 marks]

[4 markah]

- iii. Calculate the selling price.

*Kirakan harga jualan yang dikenakan.*

[3 marks]

[3 markah]

## QUESTION 2

### SOALAN 2

Fareez Enterprise Company is planning to buy a new machine. They were offered with **TWO (2)** machines which will cost RM225,000 for Machine X and RM230,000 for Machine Y. The required rate of return for both machines was established at 10%. The estimated cash flow for both machines are listed as follows:

*Syarikat Fareez Enterprise merancang untuk membeli mesin baru. Mereka ditawarkan **DUA (2)** buah mesin yang memerlukan kos sebanyak RM225,000 untuk Mesin X dan RM230,000 untuk mesin Y. Kadar pulangan diperlukan bagi kedua-dua mesin telah ditetapkan sebanyak 10%. Anggaran aliran tunai untuk kedua dua mesin adalah seperti berikut:*

| Year/<br>Tahun | Cash flow/ Aliran Tunai              |                                      |
|----------------|--------------------------------------|--------------------------------------|
|                | Machine X (RM)<br><i>Mesin X(RM)</i> | Machine Y (RM)<br><i>Mesin Y(RM)</i> |
| 1              | 95,000                               | 115,000                              |
| 2              | 85,000                               | 95,000                               |
| 3              | 75,000                               | 85,000                               |
| 4              | 85,000                               | 75,000                               |
| 5              | 95,000                               | 65,000                               |

You are required to:

*Anda dikehendaki untuk:*

CLO1  
C1

- a) Identify the elements following for both machines :  
*Kenalpasti elemen yang berikut bagi kedua-dua mesin:*

- i. Payback period (PBP).

*Tempoh bayar balik(TBB).*

[4 marks]

[4 markah]

- ii. Average rate of return (ARR).

*Kadar Pulangan Purata (KPP).*

[6 marks]

[6 markah]

CLO1  
C2

- b) Calculate and determine:  
*Kira dan tentukan:*

- i. The Net present value (NPV) for both machines.

*Nilai kini bersih bagi kedua-dua mesin.*

[ 13 marks]

[13 markah]

- ii. Which machine should be chosen? Why?  
*Mesin yang manakah patut dipilih? Kenapa?*

[2 marks]

[2 markah]

### QUESTION 3

#### *SOALAN 3*

CLO2  
C2

- a) Syuhada plans to replace her old car with a new one that costs RM95,200. The down payment that she can afford is RM17,000. She plans to borrow the rest from the bank. The bank offers the loan that can be settled by the monthly installment of RM1,175 for 90 months. Calculate:

*Syuhada bercadang untuk menggantikan kereta lamanya dengan kereta baru yang bernilai RM95,200. Bayaran muka yang mampu disediakan oleh beliau adalah RM17,000. Beliau bercadang untuk meminjam bakinya daripada bank. Pihak bank menawarkan pinjaman yang boleh diselesaikan dengan bayaran ansuran bulanan sebanyak RM1,175 untuk tempoh 90 bulan. Kira:*

- i. The interest rate charged by the bank.

*Kadar faedah yang dikenakan oleh pihak bank.*

[8 marks]

[8 markah]

- ii. The amount of interest charged by the bank

*Jumlah faedah yang dikenakan oleh pihak bank*

[2 marks]

[2 markah]

CLO2  
C3

- c) Aidil had deposited RM5 000 into a saving account on 30<sup>th</sup> March 2015 which offers a simple interest rate of 3.5% per annum. On 27<sup>th</sup> October 2015, he withdrew RM500 from the account. Calculate:

*Aidil telah menyimpan RM5 000 ke dalam akaun simpanannya pada 30 Mac 2015 yang menawarkan kadar faedah ringkas sebanyak 3.5% untuk tempoh setahun. Pada 27 Oktober 2015, beliau telah mengeluarkan RM500 dari akaun tersebut. Kira:*

- i. The exact time and approximate time for the date he deposited the money until the date he withdrew his saving.

*Masa tepat dan masa anggaran bagi tempoh dia mula menyimpan wangnya sehingga ke tarikh dia mengeluarkan wangnya.*

[5 marks]

[5 markah]

- ii. The interest received on the date he withdrew his saving using Banker's Rule method.

*Faedah yang diterima pada tarikh dia mengeluarkan wangnya dengan menggunakan kaedah Aturan Bank.*

[3 marks]

[3 markah]

- iii. The amount that is left in the account a year after withdrawal.

*Jumlah wang yang tinggal di dalam akaun beliau selepas setahun pengeluaran.*

[7 marks]

[7 markah]

**QUESTION 4*****SOALAN 4***

Reez Wood Sdn Bhd produces office cabinets in factories which are located in Ipoh, Seremban and Pasir Gudang. The office cabinets are distributed to the warehouses in Arau, Butterworth and Cheras. Transportation costs per unit from the factories to the warehouses are shown in the following table;

*Reez Wood Sdn Bhd menghasilkan kabinet pejabat di kilang-kilang yang terletak di Ipoh, Seremban dan Pasir Gudang. Syarikat tersebut hendak mengedarkan kabinet pejabat tersebut ke gudang-gudang mereka yang terletak di Arau, Butterworth dan Cheras. Kos pengangkutan seunit dari kilang ke gudang-gudang adalah seperti jadual berikut;*

| Factory      | Arau | Butterworth | Cheras |
|--------------|------|-------------|--------|
| Ipoh         | RM37 | RM34        | RM36   |
| Seremban     | RM36 | RM32        | RM35   |
| Pasir Gudang | RM42 | RM35        | RM41   |

The capacity for each factory and the requirement for the warehouses are listed below:

*Kapisiti kilang-kilang dan keperluan gudang adalah seperti berikut:*

| Factory      | Capacity<br>(units) | Warehouse   | Requirement<br>(units) |
|--------------|---------------------|-------------|------------------------|
| Ipoh         | 300                 | Arau        | 200                    |
| Seremban     | 200                 | Butterworth | 170                    |
| Pasir Gudang | 100                 | Cheras      | 230                    |

- |            |   |                           |
|------------|---|---------------------------|
| CLO2<br>C1 | a) Tabulate the complete matrix for the transportation table.<br><i>Bentukkan jadual matriks untuk pengangkutan yang lengkap.</i>   | [5 marks]<br>[5 markah]   |
| CLO2<br>C2 | b) Calculate the transportation cost by using Minimum Cost Method.<br><i>Kirakan kos pengangkutan dengan menggunakan Kaedah Kos Minimum.</i>                                    | [5 marks]<br>[5 markah]   |
| CLO2<br>C3 | c) Calculate the optimal transportation cost by using the Stepping Stone Method.<br><i>Kirakan kos pengangkutan yang paling optima dengan menggunakan Kaedah Batu Loncatan.</i> | [15 marks]<br>[15 markah] |

**SOALAN TAMAT**

Present value interest factors for one dollar discounted at  $k$  per cent for  $n$  periods:  $PVIF_{k,n} = 1/(1+k)^n$

| Period | 1%     | 2%     | 3%     | 4%     | 5%     | 6%     | 7%      | 8%     | 9%     | 10%    | 11%    | 12%    | 13%    | 14%    | 15%    | 16%    | 20%    | 24%    | 25%    | 30%    |
|--------|--------|--------|--------|--------|--------|--------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 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 | 0.8333 | 0.8065 | 0.8000 | 0.7692 |
| 2      | 0.9803 | 0.9612 | 0.9426 | 0.9246 | 0.9070 | 0.8900 | 0.8734  | 0.8573 | 0.8417 | 0.8264 | 0.8116 | 0.7972 | 0.7831 | 0.7695 | 0.7561 | 0.7432 | 0.6944 | 0.6504 | 0.6400 | 0.5917 |
| 3      | 0.9706 | 0.9423 | 0.9151 | 0.8890 | 0.8638 | 0.8396 | 0.8163  | 0.7938 | 0.7722 | 0.7513 | 0.7312 | 0.7118 | 0.6931 | 0.6750 | 0.6575 | 0.6407 | 0.587  | 0.5245 | 0.5120 | 0.4552 |
| 4      | 0.9610 | 0.9238 | 0.8895 | 0.8548 | 0.8227 | 0.7921 | 0.7629  | 0.7350 | 0.7084 | 0.6830 | 0.6587 | 0.6355 | 0.6133 | 0.5921 | 0.5718 | 0.5523 | 0.4823 | 0.4230 | 0.4096 | 0.3501 |
| 5      | 0.9515 | 0.9057 | 0.8626 | 0.8219 | 0.7825 | 0.7473 | 0.7130  | 0.6806 | 0.6499 | 0.6209 | 0.5935 | 0.5674 | 0.5428 | 0.5194 | 0.4972 | 0.4761 | 0.4019 | 0.3411 | 0.3277 | 0.2693 |
| 6      | 0.9420 | 0.8880 | 0.8375 | 0.7903 | 0.7462 | 0.7050 | 0.6663  | 0.6302 | 0.5963 | 0.5645 | 0.5346 | 0.5066 | 0.4803 | 0.4556 | 0.4323 | 0.4104 | 0.3349 | 0.2751 | 0.2621 | 0.2072 |
| 7      | 0.9327 | 0.8706 | 0.8131 | 0.7599 | 0.7107 | 0.6651 | 0.6227  | 0.5835 | 0.5470 | 0.5132 | 0.4817 | 0.4523 | 0.4251 | 0.3996 | 0.3759 | 0.3538 | 0.2791 | 0.2218 | 0.2097 | 0.1594 |
| 8      | 0.9235 | 0.8535 | 0.7894 | 0.7307 | 0.6788 | 0.6274 | 0.5820  | 0.5403 | 0.5019 | 0.4665 | 0.4339 | 0.4039 | 0.3762 | 0.3506 | 0.3269 | 0.3050 | 0.2526 | 0.1789 | 0.1658 | 0.1226 |
| 9      | 0.9143 | 0.8368 | 0.7664 | 0.7026 | 0.6446 | 0.5919 | 0.5439  | 0.5002 | 0.4604 | 0.4241 | 0.3909 | 0.3606 | 0.3329 | 0.3075 | 0.2843 | 0.2630 | 0.1938 | 0.1443 | 0.1342 | 0.0943 |
| 10     | 0.9053 | 0.8203 | 0.7441 | 0.6756 | 0.6139 | 0.5584 | 0.5083  | 0.4632 | 0.4224 | 0.3855 | 0.3522 | 0.3220 | 0.2946 | 0.2697 | 0.2472 | 0.2267 | 0.1615 | 0.1164 | 0.1074 | 0.0725 |
| 11     | 0.8963 | 0.8043 | 0.7224 | 0.6496 | 0.5847 | 0.5268 | 0.4751  | 0.4289 | 0.3875 | 0.3505 | 0.3173 | 0.2875 | 0.2507 | 0.2366 | 0.2149 | 0.1954 | 0.1346 | 0.0938 | 0.0859 | 0.0558 |
| 12     | 0.8874 | 0.7895 | 0.7014 | 0.6246 | 0.5568 | 0.4970 | 0.4440  | 0.3971 | 0.3555 | 0.3186 | 0.2858 | 0.2567 | 0.2307 | 0.2076 | 0.1869 | 0.1685 | 0.1122 | 0.0757 | 0.0687 | 0.0429 |
| 13     | 0.8787 | 0.7730 | 0.6810 | 0.6066 | 0.5303 | 0.4688 | 0.4150  | 0.3677 | 0.3262 | 0.2897 | 0.2575 | 0.2292 | 0.2042 | 0.1821 | 0.1625 | 0.1452 | 0.0935 | 0.0610 | 0.0550 | 0.0330 |
| 14     | 0.8700 | 0.7579 | 0.6611 | 0.5775 | 0.5051 | 0.4423 | 0.3878  | 0.3405 | 0.2992 | 0.2633 | 0.2320 | 0.2046 | 0.1807 | 0.1597 | 0.1413 | 0.1252 | 0.0779 | 0.0492 | 0.0440 | 0.0254 |
| 15     | 0.8613 | 0.7430 | 0.6419 | 0.5553 | 0.4810 | 0.4173 | 0.35624 | 0.3152 | 0.2745 | 0.2394 | 0.2090 | 0.1827 | 0.1599 | 0.1401 | 0.1229 | 0.1079 | 0.0649 | 0.0397 | 0.0352 | 0.0195 |
| 16     | 0.8528 | 0.7284 | 0.6232 | 0.5339 | 0.4581 | 0.3936 | 0.3387  | 0.2919 | 0.2519 | 0.2176 | 0.1883 | 0.1631 | 0.1415 | 0.1229 | 0.1069 | 0.0930 | 0.0541 | 0.0320 | 0.0281 | 0.0150 |
| 17     | 0.8444 | 0.7142 | 0.6050 | 0.5134 | 0.4363 | 0.3714 | 0.3166  | 0.2703 | 0.2311 | 0.1978 | 0.1696 | 0.1456 | 0.1252 | 0.1078 | 0.0929 | 0.0802 | 0.0451 | 0.0258 | 0.0225 | 0.0116 |
| 18     | 0.8360 | 0.7002 | 0.5874 | 0.4936 | 0.4155 | 0.3503 | 0.2959  | 0.2502 | 0.2120 | 0.1799 | 0.1528 | 0.1300 | 0.1108 | 0.0946 | 0.0808 | 0.0691 | 0.0376 | 0.0208 | 0.0190 | 0.0089 |
| 19     | 0.8277 | 0.6864 | 0.5703 | 0.4746 | 0.3957 | 0.3305 | 0.2763  | 0.2317 | 0.1945 | 0.1635 | 0.1377 | 0.1161 | 0.0981 | 0.0829 | 0.0703 | 0.0596 | 0.0313 | 0.0168 | 0.0144 | 0.0068 |
| 20     | 0.8195 | 0.6730 | 0.5537 | 0.4561 | 0.3769 | 0.3118 | 0.2584  | 0.2145 | 0.1784 | 0.1486 | 0.1240 | 0.1037 | 0.0868 | 0.0728 | 0.0611 | 0.0514 | 0.0261 | 0.0135 | 0.0115 | 0.0053 |
| 21     | 0.8114 | 0.6598 | 0.5375 | 0.4388 | 0.3589 | 0.2942 | 0.2415  | 0.1987 | 0.1637 | 0.1351 | 0.1117 | 0.0926 | 0.0768 | 0.0638 | 0.0531 | 0.0443 | 0.0217 | 0.0109 | 0.0092 | 0.0040 |
| 22     | 0.8034 | 0.6468 | 0.5219 | 0.4220 | 0.3418 | 0.2775 | 0.2257  | 0.1839 | 0.1502 | 0.1228 | 0.1007 | 0.0826 | 0.0680 | 0.0560 | 0.0462 | 0.0382 | 0.0181 | 0.0088 | 0.0074 | 0.0031 |
| 23     | 0.7954 | 0.6342 | 0.5067 | 0.4057 | 0.3256 | 0.2618 | 0.2109  | 0.1703 | 0.1318 | 0.1117 | 0.0907 | 0.0738 | 0.0601 | 0.0491 | 0.0402 | 0.0329 | 0.0151 | 0.0071 | 0.0059 | 0.0024 |
| 24     | 0.7876 | 0.6217 | 0.4919 | 0.3901 | 0.3101 | 0.2470 | 0.1971  | 0.1577 | 0.1284 | 0.1015 | 0.0817 | 0.0659 | 0.0532 | 0.0431 | 0.0349 | 0.0284 | 0.0126 | 0.0057 | 0.047  | 0.0018 |
| 25     | 0.7798 | 0.6095 | 0.4776 | 0.3751 | 0.2953 | 0.2330 | 0.1842  | 0.1460 | 0.1160 | 0.0923 | 0.0736 | 0.0588 | 0.0471 | 0.0378 | 0.0304 | 0.0245 | 0.0105 | 0.0046 | 0.0038 | 0.0014 |
| 30     | 0.7419 | 0.5521 | 0.4120 | 0.3083 | 0.2314 | 0.1741 | 0.1314  | 0.0994 | 0.0754 | 0.0573 | 0.0437 | 0.0334 | 0.0256 | 0.0196 | 0.0151 | 0.0116 | 0.0042 | 0.0016 | 0.0012 | -      |
| 35     | 0.7059 | 0.5000 | 0.3554 | 0.2534 | 0.1813 | 0.1301 | 0.0937  | 0.0676 | 0.0490 | 0.0356 | 0.0259 | 0.0189 | 0.0139 | 0.0102 | 0.0075 | 0.0055 | 0.0017 | 0.0005 | -      | -      |
| 36     | 0.6989 | 0.4902 | 0.3450 | 0.2437 | 0.1727 | 0.1227 | 0.0875  | 0.0626 | 0.0449 | 0.0323 | 0.0234 | 0.0169 | 0.0123 | 0.0089 | 0.0065 | 0.0048 | 0.0014 | -      | -      | -      |
| 40     | 0.6717 | 0.4529 | 0.3060 | 0.1420 | 0.0972 | 0.0668 | 0.0460  | 0.0318 | 0.0221 | 0.0154 | 0.0107 | 0.0075 | 0.0053 | 0.0037 | 0.0026 | 0.0007 | -      | -      | -      | -      |
| 50     | 0.6080 | 0.3715 | 0.2281 | 0.1407 | 0.0872 | 0.0543 | 0.0213  | 0.0134 | 0.0085 | 0.0054 | 0.0035 | 0.0022 | 0.0014 | 0.0006 | -      | -      | -      | -      | -      | -      |

## APPENDIX 1

Present value interest factors for one-dollar annuity discounted at  $k$  per cent for  $n$  periods;  $PVIFA = [1 - 1/(1 + k)^n]$

| Period | 1%     | 2%     | 3%     | 4%     | 5%     | 6%     | 7%     | 8%     | 9%     | 10%    | 11%    | 12%    | 13%    | 14%    | 15%    | 16%    | 20%    | 24%    | 25%    | 30%    |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 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 | 0.8333 | 0.8065 | 0.8000 | 0.7892 |
| 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 | 1.5278 | 1.4568 | 1.4400 | 1.3609 |
| 3      | 2.9410 | 2.8839 | 2.8286 | 2.7751 | 2.7332 | 2.6730 | 2.6243 | 2.5771 | 2.5313 | 2.4869 | 2.4437 | 2.4018 | 2.3612 | 2.3216 | 2.2832 | 2.2459 | 2.1085 | 1.9813 | 1.9520 | 1.8161 |
| 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 | 2.5887 | 2.4043 | 2.3616 | 2.1662 |
| 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 | 2.9906 | 2.7454 | 2.6893 | 2.4356 |
| 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 | 3.9975 | 3.8887 | 3.7845 | 3.6847 | 3.3255 | 3.0205 | 2.9514 | 2.6427 |
| 7      | 6.7282 | 6.4720 | 6.2303 | 6.0021 | 5.7864 | 5.5824 | 5.3893 | 5.2064 | 5.0330 | 4.8884 | 4.7122 | 4.5638 | 4.4226 | 4.2883 | 4.1604 | 4.0386 | 3.6046 | 3.2423 | 3.1611 | 2.8021 |
| 8      | 7.6517 | 7.3265 | 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 | 3.8372 | 3.4212 | 3.3289 | 2.9247 |
| 9      | 8.5660 | 8.1622 | 7.7861 | 7.4353 | 7.1078 | 6.8017 | 6.5152 | 6.2469 | 5.9852 | 5.7590 | 5.5370 | 5.3282 | 5.1317 | 4.9464 | 4.7716 | 4.6065 | 4.0310 | 3.5655 | 3.4631 | 3.0190 |
| 10     | 9.4713 | 8.9826 | 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 | 4.1925 | 3.6819 | 3.5705 | 3.0915 |
| 11     | 10.368 | 9.7868 | 9.2526 | 8.7605 | 8.3064 | 7.8869 | 7.4987 | 7.1390 | 6.8025 | 6.4951 | 6.2005 | 5.9377 | 5.6869 | 5.4527 | 5.2337 | 5.0286 | 4.3271 | 3.7757 | 3.6564 | 3.1473 |
| 12     | 11.225 | 10.575 | 9.9540 | 9.3051 | 8.8633 | 8.3838 | 7.9427 | 7.5361 | 7.1607 | 6.8137 | 6.4924 | 6.1944 | 5.9176 | 5.6603 | 5.4206 | 5.1971 | 4.4392 | 3.8514 | 3.7251 | 3.1903 |
| 13     | 12.134 | 11.348 | 10.635 | 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 | 4.5327 | 3.9124 | 3.7601 | 3.2233 |
| 14     | 13.004 | 12.106 | 11.296 | 10.563 | 9.8986 | 9.2950 | 8.7455 | 8.2442 | 7.7862 | 7.3667 | 6.9819 | 6.6282 | 6.3025 | 6.0021 | 5.7245 | 5.4675 | 4.6106 | 3.9616 | 3.8241 | 3.2487 |
| 15     | 13.865 | 12.849 | 11.938 | 11.118 | 10.380 | 9.7122 | 9.1079 | 8.5595 | 8.0607 | 7.6061 | 7.1909 | 6.8109 | 6.4624 | 6.1422 | 5.8474 | 5.5755 | 4.6755 | 4.0013 | 3.8593 | 3.2682 |
| 16     | 14.718 | 13.578 | 12.561 | 11.652 | 10.838 | 10.106 | 9.4466 | 8.8514 | 8.3126 | 7.8237 | 7.3792 | 6.9740 | 6.6039 | 6.2651 | 5.9542 | 5.6695 | 4.7296 | 4.0333 | 3.8814 | 3.2832 |
| 17     | 15.562 | 14.292 | 13.166 | 12.166 | 11.274 | 10.477 | 9.7632 | 9.1216 | 8.5436 | 8.0216 | 7.5488 | 7.1196 | 6.7291 | 6.3729 | 6.0472 | 5.7487 | 4.7746 | 4.0591 | 3.9099 | 3.2948 |
| 18     | 16.398 | 14.992 | 13.754 | 12.659 | 11.859 | 10.828 | 10.059 | 9.3719 | 8.7556 | 8.2014 | 7.7016 | 7.2497 | 6.8399 | 6.4674 | 6.1280 | 5.8118 | 4.8122 | 4.0799 | 3.9279 | 3.3037 |
| 19     | 17.226 | 15.679 | 14.324 | 13.134 | 12.085 | 11.158 | 10.336 | 9.6036 | 8.9501 | 8.3649 | 7.8393 | 7.3658 | 6.9380 | 6.5504 | 6.1902 | 5.8775 | 4.8435 | 4.0967 | 3.9424 | 3.3105 |
| 20     | 18.046 | 16.351 | 14.877 | 13.590 | 12.462 | 11.470 | 10.594 | 9.8181 | 9.1285 | 8.5136 | 7.9633 | 7.4694 | 7.0248 | 6.6231 | 6.2593 | 5.9286 | 4.8696 | 4.1103 | 3.9539 | 3.3158 |
| 21     | 18.857 | 17.011 | 15.415 | 14.029 | 12.821 | 11.764 | 10.836 | 10.017 | 9.2922 | 8.6487 | 8.0751 | 7.5620 | 7.1016 | 6.6810 | 6.3125 | 5.9731 | 4.8913 | 4.1212 | 3.9631 | 3.3198 |
| 22     | 19.660 | 17.658 | 15.937 | 14.451 | 13.163 | 12.042 | 11.061 | 10.201 | 9.4424 | 8.7715 | 8.1757 | 7.6446 | 7.1695 | 6.7429 | 6.3587 | 6.0113 | 4.9094 | 4.1300 | 3.9705 | 3.3230 |
| 23     | 20.456 | 18.292 | 16.444 | 14.657 | 13.489 | 12.303 | 11.272 | 10.371 | 9.5802 | 8.8882 | 8.2664 | 7.7184 | 7.2297 | 6.7921 | 6.3988 | 6.0442 | 4.9245 | 4.1371 | 3.9764 | 3.3254 |
| 24     | 21.243 | 18.914 | 16.936 | 15.247 | 13.799 | 12.550 | 11.469 | 10.529 | 9.7066 | 9.8947 | 8.3481 | 7.7843 | 7.2829 | 6.8351 | 6.4338 | 6.0726 | 4.9371 | 4.1428 | 3.9811 | 3.3272 |
| 25     | 22.023 | 19.523 | 17.413 | 15.622 | 14.094 | 12.783 | 11.654 | 10.675 | 9.8226 | 9.0770 | 8.4217 | 7.8431 | 7.3300 | 6.8729 | 6.4641 | 6.0971 | 4.9476 | 4.1474 | 3.9849 | 3.3286 |
| 30     | 25.808 | 22.396 | 19.600 | 17.292 | 15.372 | 13.365 | 12.409 | 11.274 | 9.4289 | 8.6938 | 8.0552 | 7.4857 | 7.0027 | 6.5660 | 6.1772 | 4.9789 | 4.1601 | 3.9900 | 3.3321 |        |
| 35     | 29.409 | 24.999 | 21.487 | 18.655 | 16.374 | 14.498 | 12.948 | 11.655 | 10.587 | 9.6442 | 8.8552 | 8.1755 | 7.5856 | 7.0700 | 6.6105 | 6.2153 | 4.9915 | 4.1644 | 3.9984 | 3.3330 |
| 36     | 30.108 | 25.489 | 21.832 | 18.908 | 16.547 | 14.621 | 13.035 | 11.717 | 10.612 | 9.6765 | 8.8786 | 8.1924 | 7.5979 | 7.0790 | 6.6231 | 6.2201 | 4.9929 | 4.1649 | 3.9987 | 3.3331 |
| 40     | 32.835 | 27.355 | 23.115 | 19.793 | 17.159 | 15.046 | 13.332 | 11.925 | 10.757 | 9.7791 | 8.9511 | 8.2438 | 7.6344 | 7.1050 | 6.6418 | 6.2335 | 4.9966 | 4.1659 | 3.9985 | 3.3332 |
| 50     | 39.196 | 31.542 | 25.730 | 21.482 | 18.256 | 15.762 | 13.801 | 12.233 | 10.902 | 9.9148 | 9.0417 | 8.3045 | 7.6752 | 7.1327 | 6.6605 | 6.2463 | 4.9995 | 4.1666 | 3.9999 | 3.3333 |

## APPENDIX 2

Present value interest factor of \$1 per period at i% for n periods, PVIF(i,n).

| Period | 1%    | 2%    | 3%    | 4%    | 5%    | 6%    | 7%    | 8%    | 9%    | 10%   | 11%   | 12%   | 13%   | 14%   | 15%   | 16%   | 17%   | 18%   | 19%   | 20%   |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1      | 0.990 | 0.980 | 0.971 | 0.962 | 0.952 | 0.943 | 0.935 | 0.926 | 0.917 | 0.909 | 0.901 | 0.893 | 0.885 | 0.877 | 0.870 | 0.862 | 0.855 | 0.847 | 0.840 | 0.833 |
| 2      | 0.980 | 0.961 | 0.943 | 0.925 | 0.907 | 0.890 | 0.873 | 0.857 | 0.842 | 0.826 | 0.812 | 0.797 | 0.783 | 0.769 | 0.756 | 0.743 | 0.731 | 0.718 | 0.706 | 0.694 |
| 3      | 0.971 | 0.942 | 0.915 | 0.889 | 0.864 | 0.840 | 0.816 | 0.794 | 0.772 | 0.751 | 0.731 | 0.712 | 0.693 | 0.675 | 0.658 | 0.641 | 0.624 | 0.609 | 0.593 | 0.579 |
| 4      | 0.961 | 0.924 | 0.888 | 0.855 | 0.823 | 0.792 | 0.763 | 0.735 | 0.708 | 0.683 | 0.659 | 0.636 | 0.613 | 0.592 | 0.572 | 0.552 | 0.534 | 0.516 | 0.499 | 0.482 |
| 5      | 0.951 | 0.906 | 0.863 | 0.822 | 0.784 | 0.747 | 0.713 | 0.681 | 0.650 | 0.621 | 0.593 | 0.567 | 0.543 | 0.519 | 0.497 | 0.476 | 0.456 | 0.437 | 0.419 | 0.402 |
| 6      | 0.942 | 0.888 | 0.837 | 0.790 | 0.746 | 0.705 | 0.665 | 0.630 | 0.596 | 0.564 | 0.535 | 0.507 | 0.480 | 0.455 | 0.432 | 0.410 | 0.390 | 0.370 | 0.352 | 0.335 |
| 7      | 0.933 | 0.871 | 0.813 | 0.760 | 0.711 | 0.665 | 0.623 | 0.583 | 0.547 | 0.513 | 0.482 | 0.452 | 0.425 | 0.400 | 0.376 | 0.354 | 0.333 | 0.314 | 0.296 | 0.279 |
| 8      | 0.923 | 0.853 | 0.789 | 0.731 | 0.677 | 0.627 | 0.582 | 0.540 | 0.502 | 0.467 | 0.434 | 0.404 | 0.376 | 0.351 | 0.327 | 0.305 | 0.285 | 0.266 | 0.249 | 0.233 |
| 9      | 0.914 | 0.837 | 0.765 | 0.703 | 0.645 | 0.592 | 0.544 | 0.500 | 0.460 | 0.424 | 0.391 | 0.361 | 0.333 | 0.308 | 0.284 | 0.263 | 0.243 | 0.225 | 0.209 | 0.194 |
| 10     | 0.905 | 0.820 | 0.714 | 0.676 | 0.614 | 0.558 | 0.508 | 0.463 | 0.422 | 0.386 | 0.352 | 0.322 | 0.295 | 0.270 | 0.247 | 0.227 | 0.208 | 0.191 | 0.176 | 0.162 |
| 11     | 0.896 | 0.804 | 0.722 | 0.650 | 0.595 | 0.547 | 0.495 | 0.452 | 0.417 | 0.388 | 0.350 | 0.317 | 0.287 | 0.251 | 0.231 | 0.208 | 0.187 | 0.168 | 0.152 | 0.137 |
| 12     | 0.887 | 0.788 | 0.701 | 0.625 | 0.557 | 0.497 | 0.444 | 0.397 | 0.356 | 0.319 | 0.286 | 0.257 | 0.231 | 0.208 | 0.187 | 0.168 | 0.152 | 0.137 | 0.124 | 0.112 |
| 13     | 0.879 | 0.773 | 0.681 | 0.601 | 0.530 | 0.469 | 0.415 | 0.368 | 0.326 | 0.290 | 0.258 | 0.229 | 0.204 | 0.182 | 0.163 | 0.145 | 0.130 | 0.116 | 0.104 | 0.093 |
| 14     | 0.870 | 0.758 | 0.661 | 0.577 | 0.505 | 0.442 | 0.388 | 0.299 | 0.263 | 0.232 | 0.205 | 0.181 | 0.160 | 0.141 | 0.125 | 0.111 | 0.099 | 0.088 | 0.078 |       |
| 15     | 0.861 | 0.743 | 0.642 | 0.555 | 0.481 | 0.417 | 0.362 | 0.315 | 0.275 | 0.239 | 0.209 | 0.183 | 0.160 | 0.140 | 0.123 | 0.108 | 0.095 | 0.084 | 0.074 | 0.065 |
| 16     | 0.853 | 0.728 | 0.623 | 0.534 | 0.458 | 0.394 | 0.339 | 0.292 | 0.248 | 0.218 | 0.188 | 0.163 | 0.141 | 0.123 | 0.102 | 0.093 | 0.081 | 0.071 | 0.062 | 0.054 |
| 17     | 0.844 | 0.714 | 0.605 | 0.513 | 0.436 | 0.371 | 0.317 | 0.270 | 0.231 | 0.198 | 0.170 | 0.146 | 0.125 | 0.108 | 0.093 | 0.080 | 0.069 | 0.060 | 0.052 | 0.045 |
| 18     | 0.836 | 0.700 | 0.587 | 0.494 | 0.416 | 0.350 | 0.296 | 0.250 | 0.212 | 0.180 | 0.153 | 0.130 | 0.111 | 0.095 | 0.081 | 0.069 | 0.059 | 0.051 | 0.044 | 0.038 |
| 19     | 0.828 | 0.686 | 0.570 | 0.475 | 0.396 | 0.331 | 0.277 | 0.232 | 0.194 | 0.164 | 0.138 | 0.116 | 0.098 | 0.083 | 0.070 | 0.060 | 0.051 | 0.043 | 0.037 | 0.031 |
| 20     | 0.820 | 0.673 | 0.554 | 0.456 | 0.377 | 0.312 | 0.258 | 0.215 | 0.178 | 0.149 | 0.124 | 0.104 | 0.087 | 0.073 | 0.061 | 0.051 | 0.043 | 0.037 | 0.031 | 0.026 |
| 21     | 0.811 | 0.660 | 0.530 | 0.439 | 0.359 | 0.294 | 0.242 | 0.198 | 0.161 | 0.135 | 0.112 | 0.093 | 0.073 | 0.053 | 0.044 | 0.037 | 0.031 | 0.026 | 0.022 | 0.018 |
| 22     | 0.803 | 0.647 | 0.522 | 0.422 | 0.342 | 0.278 | 0.226 | 0.184 | 0.150 | 0.123 | 0.101 | 0.083 | 0.068 | 0.056 | 0.046 | 0.038 | 0.032 | 0.026 | 0.022 | 0.018 |
| 23     | 0.795 | 0.634 | 0.507 | 0.406 | 0.326 | 0.262 | 0.211 | 0.170 | 0.138 | 0.112 | 0.091 | 0.074 | 0.060 | 0.049 | 0.033 | 0.027 | 0.022 | 0.018 | 0.015 |       |
| 24     | 0.788 | 0.622 | 0.492 | 0.390 | 0.310 | 0.247 | 0.197 | 0.158 | 0.126 | 0.102 | 0.082 | 0.066 | 0.053 | 0.043 | 0.035 | 0.028 | 0.023 | 0.019 | 0.015 | 0.013 |
| 25     | 0.780 | 0.610 | 0.478 | 0.375 | 0.295 | 0.233 | 0.184 | 0.146 | 0.116 | 0.092 | 0.074 | 0.059 | 0.047 | 0.038 | 0.030 | 0.024 | 0.020 | 0.016 | 0.013 | 0.010 |
| 26     | 0.772 | 0.598 | 0.460 | 0.351 | 0.281 | 0.220 | 0.172 | 0.135 | 0.106 | 0.084 | 0.066 | 0.053 | 0.042 | 0.032 | 0.026 | 0.021 | 0.017 | 0.014 | 0.011 | 0.009 |
| 27     | 0.764 | 0.586 | 0.450 | 0.347 | 0.288 | 0.207 | 0.161 | 0.125 | 0.098 | 0.076 | 0.060 | 0.047 | 0.037 | 0.029 | 0.023 | 0.018 | 0.014 | 0.011 | 0.009 | 0.007 |
| 28     | 0.757 | 0.574 | 0.437 | 0.333 | 0.255 | 0.196 | 0.150 | 0.116 | 0.090 | 0.069 | 0.054 | 0.042 | 0.033 | 0.026 | 0.020 | 0.016 | 0.012 | 0.010 | 0.008 | 0.006 |
| 29     | 0.749 | 0.563 | 0.424 | 0.321 | 0.243 | 0.185 | 0.141 | 0.107 | 0.082 | 0.063 | 0.048 | 0.037 | 0.029 | 0.022 | 0.017 | 0.014 | 0.011 | 0.008 | 0.006 | 0.005 |
| 30     | 0.742 | 0.552 | 0.412 | 0.308 | 0.231 | 0.174 | 0.131 | 0.099 | 0.075 | 0.057 | 0.044 | 0.033 | 0.026 | 0.020 | 0.015 | 0.012 | 0.009 | 0.007 | 0.005 | 0.004 |
| 31     | 0.735 | 0.541 | 0.400 | 0.295 | 0.220 | 0.164 | 0.123 | 0.092 | 0.069 | 0.052 | 0.039 | 0.030 | 0.023 | 0.017 | 0.013 | 0.010 | 0.008 | 0.006 | 0.005 |       |
| 32     | 0.727 | 0.531 | 0.388 | 0.285 | 0.210 | 0.155 | 0.115 | 0.085 | 0.063 | 0.047 | 0.035 | 0.027 | 0.020 | 0.015 | 0.011 | 0.009 | 0.007 | 0.005 | 0.004 | 0.003 |
| 33     | 0.720 | 0.520 | 0.377 | 0.274 | 0.200 | 0.146 | 0.107 | 0.079 | 0.058 | 0.043 | 0.032 | 0.024 | 0.018 | 0.013 | 0.010 | 0.007 | 0.006 | 0.004 | 0.003 | 0.002 |
| 34     | 0.713 | 0.510 | 0.366 | 0.264 | 0.190 | 0.138 | 0.100 | 0.073 | 0.053 | 0.039 | 0.029 | 0.021 | 0.016 | 0.012 | 0.009 | 0.006 | 0.005 | 0.004 | 0.003 | 0.002 |
| 35     | 0.706 | 0.500 | 0.355 | 0.253 | 0.181 | 0.130 | 0.094 | 0.068 | 0.049 | 0.036 | 0.026 | 0.020 | 0.015 | 0.011 | 0.008 | 0.006 | 0.004 | 0.003 | 0.002 | 0.001 |
| 36     | 0.699 | 0.494 | 0.345 | 0.244 | 0.173 | 0.123 | 0.088 | 0.063 | 0.045 | 0.032 | 0.023 | 0.017 | 0.012 | 0.009 | 0.007 | 0.005 | 0.004 | 0.003 | 0.002 | 0.001 |
| 37     | 0.692 | 0.481 | 0.335 | 0.234 | 0.164 | 0.116 | 0.082 | 0.058 | 0.041 | 0.029 | 0.021 | 0.015 | 0.011 | 0.008 | 0.006 | 0.004 | 0.003 | 0.002 | 0.001 |       |
| 38     | 0.685 | 0.471 | 0.325 | 0.225 | 0.157 | 0.109 | 0.076 | 0.054 | 0.038 | 0.027 | 0.019 | 0.013 | 0.010 | 0.007 | 0.005 | 0.004 | 0.003 | 0.002 | 0.001 |       |
| 39     | 0.678 | 0.462 | 0.316 | 0.217 | 0.149 | 0.103 | 0.071 | 0.050 | 0.035 | 0.024 | 0.017 | 0.012 | 0.009 | 0.006 | 0.004 | 0.003 | 0.002 | 0.001 | 0.001 |       |
| 40     | 0.672 | 0.453 | 0.307 | 0.208 | 0.142 | 0.097 | 0.067 | 0.046 | 0.032 | 0.022 | 0.015 | 0.011 | 0.008 | 0.005 | 0.004 | 0.003 | 0.002 | 0.001 | 0.001 |       |
| 41     | 0.665 | 0.444 | 0.298 | 0.200 | 0.135 | 0.092 | 0.062 | 0.043 | 0.029 | 0.020 | 0.014 | 0.010 | 0.007 | 0.005 | 0.003 | 0.002 | 0.002 | 0.001 | 0.001 |       |
| 42     | 0.658 | 0.435 | 0.289 | 0.193 | 0.129 | 0.087 | 0.058 | 0.039 | 0.027 | 0.018 | 0.012 | 0.009 | 0.006 | 0.004 | 0.003 | 0.002 | 0.001 | 0.001 | 0.000 |       |
| 43     | 0.652 | 0.427 | 0.281 | 0.185 | 0.123 | 0.082 | 0.055 | 0.037 | 0.025 | 0.017 | 0.011 | 0.008 | 0.005 | 0.004 | 0.002 | 0.002 | 0.001 | 0.001 | 0.000 |       |
| 44     | 0.645 | 0.418 | 0.272 | 0.178 | 0.117 | 0.077 | 0.051 | 0.034 | 0.023 | 0.015 | 0.010 | 0.007 | 0.005 | 0.003 | 0.002 | 0.001 | 0.001 | 0.000 | 0.000 |       |
| 45     | 0.639 | 0.410 | 0.264 | 0.171 | 0.111 | 0.073 | 0.051 | 0.031 | 0.021 | 0.014 | 0.009 | 0.006 | 0.004 | 0.003 | 0.002 | 0.001 | 0.001 | 0.001 | 0.000 |       |
| 46     | 0.633 | 0.402 | 0.257 | 0.165 | 0.106 | 0.069 | 0.044 | 0.029 | 0.019 | 0.012 | 0.008 | 0.005 | 0.004 | 0.003 | 0.002 | 0.001 | 0.001 | 0.000 | 0.000 |       |
| 47     | 0.626 | 0.394 | 0.249 | 0.158 | 0.101 | 0.065 | 0.042 | 0.027 | 0.017 | 0.011 | 0.007 | 0.005 | 0.004 | 0.003 | 0.002 | 0.001 | 0.001 | 0.000 | 0.000 |       |
| 48     | 0.620 | 0.387 | 0.242 | 0.152 | 0.096 | 0.061 | 0.039 | 0.025 | 0.016 | 0.010 | 0.007 | 0.004 | 0.003 | 0.002 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 |       |
| 49     | 0.614 | 0.379 | 0.235 | 0.146 | 0.092 | 0.058 | 0.036 | 0.023 | 0.015 | 0.009 | 0.006 | 0.004 | 0.003 | 0.002 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 |       |
| 50     | 0.608 | 0.372 | 0.228 | 0.141 | 0.087 | 0.054 | 0.034 | 0.021 | 0.013 | 0.009 | 0.005 | 0.003 | 0.002 | 0.001 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 |       |

Present value interest factor of an (ordinary) annuity of \$1 per period at i% for n periods, PVIFA(i,n).

| Period | 1%     | 2%     | 3%     | 4%     | 5%     | 6%     | 7%     | 8%     | 9%     | 10%   | 11%   | 12%   | 13%   | 14%   | 15%       | 16%   | 17%   | 18%   | 19%   | 20%   |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|-------|-------|-----------|-------|-------|-------|-------|-------|
| 1      | 0.990  | 0.980  | 0.971  | 0.962  | 0.952  | 0.943  | 0.935  | 0.926  | 0.917  | 0.909 | 0.901 | 0.893 | 0.885 | 0.877 | 0.870     | 0.862 | 0.855 | 0.847 | 0.840 | 0.833 |
| 2      | 1.970  | 1.942  | 1.913  | 1.886  | 1.859  | 1.833  | 1.808  | 1.783  | 1.759  | 1.735 | 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     | 3.695 | 3.599 | 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  | 4.888 | 4.712 | 4.564 | 4.423 | 4.288 | 4.160     | 4.039 | 3.922 | 3.812 | 3.706 | 3.605 |
| 8      | 7.652  | 7.325  | 7.020  | 6.732  | 6.463  | 6.210  | 5.971  | 5.747  | 5.535  | 5.335 | 5.146 | 4.968 | 4.799 | 4.639 | 4.487     | 4.334 | 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 | 5.528 | 5.328 | 5.132 | 4.946 | 4.772     | 4.607 | 4.51  | 4.451 | 4.303 | 4.163 |
| 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     | 4.853 | 4.659 | 4.494 | 4.339 | 4.192 |
| 11     | 10.388 | 9.787  | 9.253  | 8.760  | 8.305  | 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     | 11.285 | 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 | 4.39  |
| 13     | 12.134 | 11.348 | 10.635 | 9.986  | 9.394  | 8.853  | 8.358  | 7.904  | 7.487  | 7.103 | 6.750 | 6.424 | 6.122 | 5.842 | 5.583     | 5.342 | 5.118 | 4.910 | 4.775 | 4.533 |
| 14     | 13.004 | 12.106 | 11.296 | 10.563 | 9.899  | 9.295  | 8.745  | 8.244  | 7.786  | 7.367 | 6.926 | 6.502 | 6.02  | 5.724 | 5.468     | 5.229 | 5.008 | 4.802 | 4.611 | 4.421 |
| 15     | 13.895 | 12.849 | 11.938 | 11.110 | 10.380 | 9.712  | 9.108  | 8.529  | 8.061  | 7.562 | 7.191 | 6.811 | 6.462 | 5.847 | 5.575     | 5.324 | 5.092 | 4.876 | 4.675 | 4.473 |
| 16     | 14.718 | 13.578 | 12.561 | 11.652 | 10.830 | 10.106 | 9.447  | 8.851  | 8.313  | 7.824 | 7.379 | 6.974 | 6.604 | 6.265 | 5.954     | 5.608 | 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 | 11.828 | 10.959 | 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 | 4.591 |
| 19     | 17.226 | 15.678 | 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 | 16.351 | 14.877 | 13.590 | 12.672 | 11.470 | 10.594 | 9.819  | 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  | 8.675 | 8.175 | 7.649 | 7.102 | 6.679 | 6.312     | 5.973 | 5.665 | 5.384 | 5.127 | 4.891 |
| 22     | 19.660 | 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     | 21.243 | 18.914 | 16.936 | 15.247 | 13.799 | 12.550 | 11.469 | 10.529 | 9.707  | 9.085 | 8.348 | 7.784 | 7.283 | 6.835 | 6.434     | 6.073 | 5.746 | 5.451 | 5.182 | 4.937 |
| 25     | 22.023 | 19.523 | 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 |
| 26     | 22.795 | 17.877 | 15.983 | 14.375 | 13.003 | 11.826 | 10.810 | 9.929  | 9.161  | 8.468 | 7.894 | 7.372 | 6.906 | 6.491 | 6.118     | 5.783 | 5.480 | 5.206 | 4.956 | 4.721 |
| 27     | 23.560 | 20.707 | 18.327 | 16.330 | 14.643 | 13.211 | 11.987 | 10.935 | 10.027 | 9.237 | 8.549 | 7.943 | 7.409 | 6.939 | 6.514     | 6.136 | 5.799 | 5.492 | 5.215 | 4.964 |
| 28     | 24.316 | 21.281 | 18.764 | 16.663 | 14.898 | 13.406 | 12.137 | 11.051 | 10.307 | 9.602 | 8.984 | 8.441 | 6.961 | 6.534 | 6.152     | 5.812 | 5.502 | 5.223 | 4.970 | 4.729 |
| 29     | 25.066 | 21.844 | 19.188 | 16.984 | 15.141 | 13.591 | 12.278 | 11.158 | 10.198 | 9.370 | 8.650 | 8.022 | 7.470 | 6.983 | 6.551     | 6.166 | 5.820 | 5.510 | 5.229 | 4.975 |
| 30     | 25.808 | 22.396 | 19.600 | 17.292 | 15.372 | 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 |
| 31     | 26.562 | 22.938 | 20.000 | 17.588 | 15.593 | 13.929 | 12.532 | 11.350 | 10.343 | 9.479 | 8.733 | 8.085 | 7.518 | 7.020 | 6.579     | 6.187 | 5.837 | 5.523 | 5.239 | 4.982 |
| 32     | 27.270 | 20.389 | 17.189 | 15.803 | 14.084 | 12.647 | 11.351 | 10.345 | 9.526  | 8.769 | 8.112 | 7.558 | 7.035 | 6.591 | 6.196     | 5.844 | 5.528 | 5.243 | 4.985 | 4.721 |
| 33     | 27.990 | 23.989 | 18.148 | 16.003 | 14.230 | 12.754 | 11.514 | 10.464 | 9.569  | 8.756 | 8.046 | 7.508 | 7.048 | 6.600 | 6.203     | 5.849 | 5.532 | 5.246 | 4.988 | 4.721 |
| 34     | 28.703 | 24.499 | 21.132 | 18.411 | 16.193 | 14.368 | 12.854 | 11.587 | 10.518 | 9.609 | 8.829 | 8.157 | 7.572 | 7.050 | 6.609     | 6.210 | 5.854 | 5.536 | 5.249 | 4.990 |
| 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 |
| 36     | 30.108 | 25.489 | 21.832 | 18.908 | 16.547 | 14.621 | 13.035 | 11.717 | 10.612 | 9.677 | 8.879 | 8.192 | 7.598 | 7.079 | 6.623     | 6.220 | 5.862 | 5.541 | 5.253 | 4.993 |
| 37     | 30.800 | 25.969 | 22.167 | 19.143 | 16.711 | 14.737 | 13.117 | 11.775 | 10.653 | 9.706 | 8.900 | 8.208 | 7.609 | 7.087 | 6.629     | 6.224 | 5.865 | 5.543 | 5.255 | 4.994 |
| 38     | 31.485 | 26.492 | 22.492 | 19.368 | 16.868 | 14.846 | 13.193 | 11.829 | 10.691 | 9.733 | 8.919 | 8.221 | 7.618 | 7.094 | 6.634     | 6.228 | 5.867 | 5.545 | 5.256 | 4.995 |
| 39     | 32.183 | 26.903 | 22.808 | 19.584 | 17.017 | 14.949 | 13.265 | 11.878 | 10.757 | 9.757 | 9.936 | 8.233 | 7.627 | 7.100 | 6.638     | 6.231 | 5.869 | 5.547 | 5.257 | 4.996 |
| 40     | 32.833 | 27.355 | 23.115 | 19.793 | 17.159 | 15.046 | 13.332 | 11.925 | 10.757 | 9.799 | 9.951 | 8.244 | 7.634 | 7.105 | 6.642     | 6.233 | 5.871 | 5.548 | 5.258 | 4.997 |
| 41     | 33.500 | 27.799 | 23.412 | 19.993 | 17.294 | 15.138 | 13.394 | 11.967 | 10.787 | 9.799 | 9.965 | 8.253 | 7.641 | 7.110 | 6.645     | 6.236 | 5.873 | 5.549 | 5.259 | 4.997 |
| 42     | 34.158 | 28.235 | 23.701 | 20.186 | 17.423 | 15.225 | 13.452 | 12.007 | 10.813 | 9.817 | 9.977 | 8.262 | 7.647 | 7.114 | 6.648     | 6.238 | 5.874 | 5.550 | 5.260 | 4.998 |
| 43     | 34.810 | 28.662 | 23.982 | 20.371 | 17.516 | 15.306 | 13.507 | 12.043 | 10.838 | 9.834 | 9.989 | 8.270 | 7.652 | 7.117 | 6.650     | 6.239 | 5.875 | 5.551 | 5.260 | 4.998 |
| 44     | 35.155 | 29.080 | 24.254 | 20.549 | 17.663 | 15.383 | 13.558 | 12.077 | 10.861 | 9.849 | 9.989 | 8.276 | 7.657 | 7.120 | 6.652     | 6.241 | 5.876 | 5.552 | 5.261 | 4.998 |
| 45     | 36.095 | 29.490 | 24.519 | 20.720 | 17.74  | 15.456 | 13.606 | 12.108 | 10.881 | 9.863 | 9.908 | 8.283 | 7.661 | 7.123 | 6.654     | 6.242 | 5.877 | 5.552 | 5.261 | 4.999 |
| 46     | 36.727 | 29.892 | 24.775 | 20.885 | 17.524 | 13.600 | 12.137 | 10.900 | 9.875  | 9.016 | 8.288 | 7.664 | 7.125 | 6.656 | 6.243     | 5.878 | 5.553 | 5.261 | 4.999 | 4.730 |
| 47     | 37.354 | 30.287 | 25.025 | 21.043 | 17.981 | 15.589 | 13.692 | 12.164 | 10.918 | 9.887 | 9.024 | 8.293 | 7.668 | 7.128 | 6.657     | 6.244 | 5.879 | 5.553 | 5.262 | 4.999 |
| 48     | 37.974 | 30.673 | 25.267 | 21.195 | 18.077 | 15.650 | 13.750 | 12.189 | 10.934 | 9.997 | 9.030 | 8.297 | 7.671 | 7.130 | 6.659     | 6.245 | 5.879 | 5.554 | 5.262 | 4.999 |
| 49     | 38.598 | 31.052 | 25.502 | 21.341 | 18.169 | 15.708 | 13.767 | 12.212 | 10.948 | 9.906 | 9.036 | 8.301 | 7.673 | 7.131 | 6.660</td |       |       |       |       |       |