## EASTERN UNIVERSITY, SRII LANKA

FACULTY OF COMMERCE AND MANAGEMENT
Year First Semester Examination in Bachelor of Commerce (Specialization in Accounting and Finance)-2014/2015(May 2017) (Proper)

DAF 4043 Portfolio Investment Analysis

Describe how investment funds, pension funds and life insurance companies mach act as financial intermediaries.
(05 Marks)
The investment management process describes how an investor should go about naking decisions. Investment management process can be disclosed by fivestep procedure. Briefly explain the steps.
(05 Marks)

Distinguish between financial investment and real investment.
(05 Marks)
What factors might an individual investor take into account in determining his/her investment policy?
(05 Marks)
(Total 25 Marks)
02. (I) Describe the different types of returns.
(II) What is the use of Coefficient of Variation in investment decision? If two assst and $Y$, are said to have expected returns of $10 \%$ and $15 \%$ and standard derifen of returns of $5 \%$ and $12 \%$ respectively, which asset shall be seledes investment?
(O4) 112
(III) Calculate the Expected Rate of Return and the Standard Deviation of the Retr for an asset which has the following possible returns with associated probatifit

| Possible Returns (\%) | 22 | 12 | 18 | 00 | -05 | 14 | 03 | $\cdot 2)$ |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Probabilities | 0.05 | 0.16 | 0.24 | 0.10 | 0.15 | 0.10 | 0.14 | 0.68 |

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(IV) Securities $P, Q$ and $R$ have the following characteristics:

| Probability | Possible Return (\%) |  |  |
| :---: | :---: | :---: | :---: |
|  | Security P | Security Q | Security R |
| 0.20 | -21 | 13 | 10 |
| 0.50 | 06 | 17 | 12 |
| 0.30 | 31 | -12 | 15 |

## Required:

Calculate the following:
(a) The Co-Variance between returns of the Securities.
(b) The Correlation Coefficients between returns of the Securities
(c) The Expected Rate of Return and the Standard deviation of the returns the portfolio of securities $P, Q$ and $R$, combined with equal weights.
ithe risk-free rate of return is $7.5 \%$ and the return on the market portfolio is $12.5 \%$, what is the expected return on an asset having a Beta of 1.75 , acoording to the CAPM?

The following investment portfolios are evaluated by an investor:

| Portfolio | $\mathrm{E}\left(\mathrm{R}_{\mathrm{P}}\right)(\%)$ | $\sigma_{P}(\%)$ |
| :---: | :---: | :---: |
| A | 16 | 20 |
| B | 12 | 12 |
| C | 12 | 13 |

Using Markowitz portfolio theory, explain the choice for the investor between porfolios $\mathrm{A}, \mathrm{B}$ and C .

An investor owns the portfolio composed of four securities. The Betas of these securities and the investments on them are shown below. What is the Beta of the investor's portfolio?

| Securities | Beta | Investment in <br> Portfolio (Rs.) |
| :---: | :---: | :---: |
| A | 0.8 | 300,000 |
| B | 1.2 | 450,000 |
| C | -0.9 | 150,000 |
| D | -1.0 | 100,000 |

(05 Marks)
(IV) From the following information, find out the minimum risk portfolio:

$$
\begin{array}{ll}
\mathrm{E}\left(\mathrm{R}_{A}\right)=17 \% & \mathrm{E}\left(\mathrm{R}_{B}\right)=22 \% \\
\sigma_{A}=11 \% & \sigma_{B}=19 \%
\end{array}
$$

$$
\operatorname{Cor}_{A B}={ }^{+} 0.5
$$

(V) An Investor owns a portfolio of four securities. The characteristics of the securitiesti their proportions in the portfolio are presented below.

| Security | Beta | Proportion <br> (\%) | Expected <br> Return (\%) |
| :---: | :---: | :---: | :---: |
| L | 2.50 | 35 | 20 |
| M | 0.95 | 25 | 12 |
| N | 1.00 | 15 | 10 |
| O | -1.25 | 25 | 15 |

## Required:

(a) What is the expected rate of return of this portfolio?
(b) What is the risk of the portfolio?
(c) If the investor wants to reduce risk in his portfolio how he cou restructure his portfolio?
following are the annual returns of Share of $N$ plc and the market ( $M$ ) for the last par's

| Year | Returns (\%) |  |
| :---: | :---: | :---: |
|  | $\mathbf{N}$ | $\mathbb{M}$ |
| 2012 | 13 | 14 |
| 2013 | 16 | 19 |
| 2014 | -03 | 00 |
| 2015 | 14 | 21 |
| 2016 | -05 | -08 |

ired:

Determine the beta coefficient for N
How much is (a) Total Risk, (b) Systematic Risk, and (c) Unsystematic Risk of the share of N plc.

A portfolio consists of four securities $\mathrm{A}, \mathrm{B}, \mathrm{X}$, and Y . with the following characteristics.

| characteristics. | $\mathbf{A}$ | $\mathbf{B}$ | $\mathbf{X}$ | $\mathbf{Y}$ | - | - |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 24 | 20 | 18 | 1,5 |  |  |
| Expected Return (\%) | 24 | 15 | 13 | 11 |  |  |
| Standard Deviation (\%) | 18 | 15 | AY | BX | BY | XY |
| Combination | AB | AX | A |  |  |  |
| Correlation | -0.50 | +0.60 | -0.20 | +0.40 | -0.25 | +0.10 |

guired:
te securities are equally weighted, how much is the risk and return of the portfolios of se four securities?
(III) An investor holds an investment on the bonds of BSN plc having a par valuen Rs. 1000 each with coupon rate of $13 \%$ per annum payable semi annuallyat the maturity of 12 years.
(i) What is the value of a bond today if the market rate of return is equal to coupon rate?
(ii) What will be the value of the bond if the market interest rate increasess $15 \%$ at the end of one year?
(iii) What will be the value of the bond if the market interest rate decreasest $10 \%$ at the end of five years?
(iv) If the value of the bond is Rs. 1250 after two years from the date of issure what would be the YTM of the bond?

Table A-1 Future Value Interest Factors for One Dollar Compounded at $k$ Percent for $n$ Periods: $F V / F_{k, n}=(1+k)$


71 4.3839 7.1067 11.467 $18.420 \quad 29.457$ Periods: $F V / F A_{k, n}=\left[(1+k)^{n}-1\right] / k$


| 102 | 75.1 | 95.026 | 120.800 | 154.762 | 109.029 |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 159 | 112.27 | 152.667 | 209.348 | 290.336 | 406.529 | 573.770 | 815.084 |

Table A－3 Present Value Interest Factors for One Dollar Discounted at $k$ Percent for $n$ Periods：$P V / F F_{k, n}=1 /(1+k)^{n}$

| Period | 1\％ | 2\％ | 3\％ | 4\％ | 5\％ | 6\％ | 7\％ | 8\％ | 9\％ | 10\％ | 14\％ | 12\％ | 13\％ | 14\％ | 15\％ | 16\％ | 20\％ | $24 \%$ | 28 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 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 | 0.0565 | い沙 |  |
| 2 | 0.9603 | 0.9512 | 0.9426 | 0.9246 | 0．9070 | 0.8900 | 0.8734 | 0.8573 | 0.8417 | 0.8264 | 0.8115 | 0．7972 | 0.7831 | 0.7695 | 0.7561 | 0.7432 | 0．694 | 0．55）4 | Uk！ |  |
| 3 | 0．9706 | 0.9423 | 0.9151 | 0.8890 | 0.8636 | 0.8395 | 0.8163 | 0．7938 | 0.7722 | 0.7513 | 0.7312 | 0.7118 | 0.6931 | 0.6750 | 0.6575 | 0.6407 | 0.5787 | 0.524 | 1514 |  |
| 4 | 0.9610 | 0.9238 | 0.8885 | 0.8548 | 0.8227 | 0.7921 | 0.7629 | 0.7350 | c．7084 | 0.6830 | 0.6587 | 0.6355 | 0.6133 | 0.5921 | 0.5718 | 0.5523 | 0.4823 | 1230 | 以澵 |  |
| 5 | 0.9515 | 0.5057 | 0.8626 | 0.8219 | 0.7835 | 0.7473 | 0.7130 | 0.5806 | 0.6499 | 0.6209 | 0.5935 | 0.5674 | 0.5428 | 0.5194 | 0.4972 | 0.4761 | 0.4019 | 0.3411 | 1 130 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 | 0.9420 | 0.8880 | 0.8375 | 0.7903 | 0.7462 | 0.7050 | 0.6663 | 0.6302 | 0.5963 | 0.5645 | 0.5346 | 0.5055 | 0.4803 | 0.4556 | 0.4323 | 0.4104 | 0．3349 | 0.2751 | 1281 |  |
| 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 | 0.2278 | 2081 |  |
| 8 | 0.9235 | 0.8535 | 0.7894 | 0.7307 | 0．6768 | 0，6274 | 0.5820 | 0.5403 | 0.5019 | 0.4665 | 0.4338 | 0.4039 | 0.3762 | 0.3508 | 0.3269 | 0.3050 | 0.2326 | 0.1729 | $4 \times 1$ |  |
| 9 | 0.9143 | 0.8368 | 0.7664 | 0.7026 | 0.6446 | 0.5919 | 0.5439 | 0.5002 | 0.4604 | 0.4241 | 0.3509 | 0.3606 | 0.3329 | 0.3075 | 0.2843 | 0.2630 | 0.1038 | 0.1443 | 6．x |  |
| 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 | 0.105 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 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 | 0.26007 | 0.2366 | 0.2149 | 0.1954 | 0.1346 | 0.0938 | 209 | 18 |
| 12 | 0.8874 | 0.7885 | 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 | unt |  |
| 13 | 0.8787 | 0.7730 | 0.6810 | 0.6005 | 0.5303 | 0.4688 | 0.4150 | 0.3677 | 0.3262 | 0.2897 | 0.2575 | 0.2292 | 0.2042 | 0.1821 | 0.1525 | 0.1452 | 0.0935 | 0.0610 | 㞅 | 1 |
| 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 | 0.125 | 0.077 | 0.0432 | One 1 | 18 |
| 15 | 0.8613 | 0.7430 | 0.6419 | 0.5553 | 0.4810 | 0.4173 | 0.3624 | 0.3152 | 0.2745 | 0.2394 | 0.2090 | 0.1827 | 0.1599 | 0.1401 | 0.1229 | 0.1079 | 0.0649 | 0.8997 | then | in |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 15 | 0.8528 | 0.7284 | 0.6232 | 0.5339 | 0.4581 | 0.3935 | 0.3387 | 0.2919 | 0.2519 | 0.2176 | 0.1883 | 0.1631 | 0.1415 | 0.1229 | 0.1069 | 0.0930 | 0.0541 | 0.0320 | 103n | ㄴㅏㅡN |
| 17 | 0.8444 | 0.7142 | 0.6050 | 0.5134 | 0.43363 | 0.3714 | 0.3166 | 0.2703 | 0.2311 | 0.1978 | 0.1696 | 0.1456 | 0.1252 | 0.1078 | 0.0929 | 0.0802 | 0.0451 | 0.2258 | tusis | 4 |
| 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 | Ons | L |
| 19 | 0.8277 | 0.6864 | 0.5703 | 0.4746 | 0.3957 | 0.3305 | 0.2765 | 0.2317 | 0.1945 | 0.1635 | 0.1377 | 0.1161 | 0.0981 | 0.0829 | 0.0703 | 05 | 313 | 0.0168 | 0154 |  |
| 20 | 0.8195 | 0.6730 | 0.5537 | 0.4564 | 0.3769 | 0.3118 | 0.2584 | 0.2145 | 0.1784 | 0.1486 | 0.1240 | 0.1037 | 0.0868 | 0.072 | 0.06 | 0.0514 | 0.0251 | 2013 | Latis | $\underline{18}$ |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 21 | 0.8114 | 0.6598 | 0.5375 | 0.4388 | 0.3589 | 0.2942 | 0.2415 | 0.1987 | 0.1637 | 0.1351 | 0.1117 | 0326 | 0.0768 | 0.06 | 0.05 | ． 04 | 0.02 | 0.0109 | 0．0er | LM |
| 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 | 0.0550 | 0.0462 | 0.0382 | 0.0181 | 0.0088 | Lunt | W |
| 23 | 0.7954 | 0.6342 | 0.5067 | 0.4057 | 0.3256 | 0.2618 | 0.2109 | 0.1703 | 0.1378 | 0.1117 | 0.0907 | 0.0738 | 0.0601 | 0.0491 | 0.0402 | ． 0329 | 0.0151 | 0.0071 | ㄲus | $1{ }^{1}$ |
| 24 | 0.7876 | 0.6217 | 0.4919 | 0.3501 | 0.3101 | 0.2470 | 0.1971 | 0.1577 | 0.1264 | 0.1015 | 0.0817 | 0.0659 | 0.0532 | 0.0431 | 0.0349 | 0284 | ． 0122 | 0.0057 | Oex | L14 |
| 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 | 0.037 | 0304 | 0.02 | 0.01 | 0.0045 | 100 | 4 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 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 |  | 0.016 | UW4 |  |
| 35 | 0.7059 | 0.5000 | 0.3554 | 0.2534 | 0.1813 | 0.1301 | 0.0937 | 0.0876 | 0.0480 | 0.0356 | 0.0259 | 0.0189 | 0.0139 | 0.0102 | 0.0075 | 0.0055 | 0.0017 | 0．005 |  |  |
| 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 | 0.3066 | 0.2083 | 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 | 0.0339 | 0.0213 | 0.0134 | 0.0085 | 0.0054 | 0.0035 | 0.0022 | 0.0014 | 0.0009 | 0.0006 | － | － | ， |  |

Table A－4 Present Value Interest Factors for a One－Dollar Annuity Discounted at $k$ Percent for $n$ Periods：PVIFA $=\left[1-1 /(1+k)^{n}\right] / k$

| Period | 1\％ | 2\％ | 3\％ | 4\％ | 5\％ | 6\％ | 7\％ | 8\％ | 9\％ | 10\％ | 11\％ | 12\％ | 13\％ | 14\％ | 15\％ | 15\％ | 20\％ | 24\％ | 298 | II |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 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 | 0.8695 | 0.8621 | 0.8333 | 0.8065 | 人日w 18 | K |
| 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 | 1.5778 | 1.4558 | 1 相 | $\underline{\square}$ |
| 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 | 2.1085 | 1.9813 | 1985 | $\underline{\square}$ |
| 4 | 3.9020 | 3.8077 | 3.7171 | 3.6299 | 3.5480 | 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 | 2341 | Ix |
| 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 | 280 | 18 |
| 6 |  |  |  | 5.2421 | 5.0757 | 9173 | 4.7655 | 4.6229 | 4.4859 | 4.3553 | 4.2305 | 4.1114 | 3.9975 | 3．8887 | 3.7845 | 3.8847 | 3.3255 | 3.0205 | 2954 | $\underline{4}$ |
| 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 | 3.6045 | 3.2423 | 21611 | $\underline{10}$ |
| 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 | 3.8372 | 3.4212 | 323 | wr |
| 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 | 4.6065 | 4.0310 | 3.5655 | 2.48 | in |
| 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 | 198 | $\underline{1}$ |
|  |  |  |  |  |  | 7．88 |  | 7.13 | 6.8052 | 6.4951 | 6.2065 | 5.9377 | 5.6869 | 5．45527， | 5．2337 | 5.0286 | 4.3271 | 775 | 1354 | 结 |
| 12 | 11.255 | 10 | 9.9540 | 9.3851 | 8.9633 | 8.3838 | 7.9427 | 7.5361 | 7.1607 | 6.8137 | 6．4．4224 | 6.1944 | 5.9176 | 5．6603 | 5.4206 | 5.1971 | 4.4392 | 3.8514 | 2781 | $\underline{19}$ |
| 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 | 4.3327 | 3.9124 | $1{ }^{1} \times 1$ | $\underline{12}$ |
| 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 | 1241 | $\underline{1}$ |
| 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 | 13s） | 边 |
|  |  |  |  |  |  | 10．10 | 9.4466 | 8.8514 | 8.3126 | 7.8237 | 7.3792 | 6.9740 | 6.8039 | 6.2651 | 5.9542 | 5．6685 | 4.7296 | 4．0333 | 1854 | II |
| 17 | 15.562 | 14.292 | 13.165 | 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 | 1．30 | 13 |
| 18 | 16.398 | 14.992 | 13.754 | 12.659 | 11.690 | 10.828 | 10.059 | 9.3719 | 8.7556 | 8.2014 | 7.7016 | 7.2497 | 6.8399 | 6.4674 | 8.1280 | 5.8178 | 4.8122 | 4.0798 | 1327 | $\underline{11}$ |
| 19 | 17.226 | 15.678 | 14.324 | 13.134 | 12.085 | 11.158 | 10．336 | 9.6036 | 8.9501 | 8.3549 | 7.8393 | 7.3658 | 6.9380 | 6.5504 | 6，1982 | 5.8775 | 4.8435 | 4.0967 | 198 | $\stackrel{1}{4}$ |
| 20 | 18.046 | 16.351 | 14.877 | 13.590 | 12.462 | 11.470 | 10.594 | 9.6181 | 9.1285 | 8． 5136 | 7.9633 | 7.4694 | 7.0248 | 6.6231 | 6.2593 | 5.9288 | 4.8696 | 4.1103 | 1959 | 12 |
|  |  |  |  |  |  |  |  |  |  |  |  | 8 |  |  |  |  |  |  |  |  |
| 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 | 7.1010 | 6.6870 | 6.3125 | 5.9731 | 4.8913 | 4.1212 | 3989 | 11 |
| 22 | 19.650 | 17.658 | 15.937 | 14.451 | 13.163 | 12.042 | 11.051 | 10.201 | 9，4424 | 8.7715 | 8.1757 | 7.6446 | 7.1695 | 6.7429 | 6.3587 | 6.0113 | 4.9094 | 4.1300 | 1975 | 11 |
| 23 | 20.456 | 18.292 | 16.444 | 14.857 | 13.489 | 12.303 | 11.272 | 10.371 | 9.5802 | 8.8832 | 8.2654 | 7.7184 | 7.2297 | 6.7921 | 6.3988 | 6.0442 | 4.9245 | 4.1371 | 374 | 1 |
| 24 | 21.243 | 18.914 | 16.936 | 15.247 | 13.799 | 12.550 | 11.469 | 10.529 | 9.7056 | 8.9847 | 8.3481 | 7.7843 | 7.2829 | 6.8351 | 6.4338 | 6．7726 | 4.9371 | 4.1428 | 3941 |  |
| 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 | 330 |  |
|  |  |  |  |  |  |  | 12 | 11.25 | 10.274 | 9.4269 | 8．6938 | 8，0552 | 7.4957 | 7.0027 | 6.5660 | 6.1772 | 4.9789 | 4.1601 | 3998 |  |
|  |  |  | 88 | 18.665 | 16.374 | 14.498 | 12.948 | 11．2585 | 10.567 | 9.6442 | 0．8552 | 8.1755 | 7．5856 | 7.0700 | 6.8166 | 6.2153 | 4.9915 | 4.1644 | 1． S M |  |
| 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 | 4.5929 | 4.1649 | 3998 |  |
| 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 | 5.2335 | 4.9956 | 4.1659 | 3930 |  |
| 50 | 39.196 | 31.424 | 25.730 | 21.482 | 18.256 | 15.762 | 13.801 | 12.233 | 10.962 | 9.9148 | 9.0417 | 8.3045 | 7.6752 | 7.1327 | 6.6605 | 6.2463 | 4.9995 | 4.1665 | 30\％ |  |

