



TAXATION PROGRAMME EXAMINATIONS

DIPLOMA LEVEL

D2: FINANCIAL MANAGEMENT

FRIDAY 19TH JUNE 2015

TOTAL MARKS – 100; TIME ALLOWED: THREE (3) HOURS

INSTRUCTIONS TO CANDIDATES

1. You have fifteen (15) minutes reading time. Use it to study the examination paper carefully so that you understand what to do in each question. You will be told when to start writing.
2. This question paper consists of **FOUR (4)** questions of Twenty Five (25) marks each. You must attempt all the **FOUR (4)** questions.
3. Enter your Student number and your National Registration Card number on the front of the answer booklet. Your name must **NOT** appear anywhere on your answer booklet.
4. Do **NOT** write in pencil (except for graphs and diagrams).
5. The marks shown against the requirement(s) for each question should be taken as an indication of the expected length and depth of the answer.
6. All workings must be done in the answer booklet.
7. Present legible and tidy work.
8. Graph paper (if required) is provided at the end of the answer booklet.
9. Formulae, Present Value, and Annuity tables are provided at the end of this question paper.

Attempt all FOUR (4) Questions

QUESTION ONE

Chimwala cement manufacturing Plc owns a machine that can produce a maximum of 500 bags of cement per hour. It's a listed company with five million shares currently trading at K6.8 per share. The initial cost of the machine was K70 million with a scrap value of K0.5 million. Following the increasing demand for cement, the Production department has proposed that the equipment be upgraded at a cost of K35 million in order to meet the demand. The upgrade can change the maximum capacity of the machine to 700 bags of cement per hour. It is expected that after the upgrade the machine will operate for an additional period of five years after which a new major investment will be required. The current selling price of a bag of cement is K65 and it is expected to increase by 8% per year. The contribution is expected to be 40% of the selling price. The machine will continue operating at the current level of 40 hours per week at full capacity. The dividend pay-out for the past five years is shown below:

Years	1	2	3	4	5
Dividend per share(ngwee)	32	38	43	41	40

Chimwala cement manufacturing Plc has a 10% redeemable debt trading at K110, with a book value of K20 million and five years to maturity. The debt was issued at a par value of K100 and redeemable at a premium of 5%.

Corporate tax is payable in the year that taxable profit arise at 25% per year.

Assume 365 days in a year.

Required:

- (a) Calculate the net present value of the proposed machine upgrade and give advice based on your findings. (17 marks)
- (b) Calculate the sensitivity of discount rate and contribution. Comment on the results. (6 marks)
- (c) State two (2) weaknesses of the net present value as an investment appraisal technique. (2 marks)

[Total: 25 marks]

QUESTION TWO

Hillcrest Woodwork Ltd is a small and medium enterprise (SME) that plans to expand its production capacity by purchasing machinery with a life span of five years at a cost of K3 million. The new machine will also require additional investment in working capital of K0.4 million and is expected to increase its annual operating cash flows before tax by K1.43 million. The most recent financial statements for the company are as follows:

Income statements for the years ending 31 December		
Year	2014	2013
	K'000	K'000
Revenue	5,000	5,000
Cost of sales	<u>(3,100)</u>	<u>(3,000)</u>
Gross Profit	1,900	2,000
Administration expenses	<u>(400)</u>	<u>(250)</u>
Profit before interest and tax	1,500	1,750
Interest	<u>(400)</u>	<u>(380)</u>
Profit before tax	1,100	1,370
Tax	<u>(330)</u>	<u>(400)</u>
Profits after tax	770	970
Dividends	<u>(390)</u>	<u>(390)</u>
Retained earnings	<u>380</u>	<u>580</u>

Statements of financial position as at 31st December				
Year	2014		2013	
	K' 000	K'000	K' 000	K'000
Non – Current Assets		6,500		6,400
Current Assets:				
Inventory	1,170		1,000	
Receivables	850		900	
Cash	<u>130</u>		<u>100</u>	
	2,150		2,000	
Current liabilities	<u>(1,150)</u>		<u>(1,280)</u>	
		1,000		720
Total net assets		<u>7,500</u>		<u>7,120</u>
Equity		4,000		3,620
10% loan stock 2019		3,500		3,500
Total equity and liabilities		<u>7,500</u>		<u>7,120</u>

The Chief Financial Officer of the company intends to finance the machinery with an issue of loan stock at a fixed rate of 8% per year.

Benchmark data for the woodwork industry is as follows:

Gearing (book value of debt/book value of equity)	100%
Interest cover	4 times
Current ratio	2:1
Inventory days	90 days
ROCE (Profit before interest and tax/capital employed)	25%

Required:

Prepare a report including the following:

- (a) Comparison of the current financial performance of the company to that of the industry. (11 marks)
- (b) Discussion of the effect on the gearing and interest cover of Hillcrest Woodwork of financing the proposed investments with an issue of loan stock, and comparison of the results with benchmark industry data. (8 marks)
- (c) Explaining three (3) possible advantages to the company of financing the machinery with an issue of ordinary shares. (6 marks)

[Total: 25 Marks]

QUESTION THREE

The financial statements of Busama Plc for 2013 are shown below:

Income statement	K' 000
Turnover	25,000
Cost of sales	<u>(8,500)</u>
Gross profit	16,500
Administration expenses	(7,000)
Distribution costs	<u>(4,500)</u>
Operating profit	5,000
Finance costs	<u>(750)</u>
Profit before tax	4,250
Taxation	<u>(1,500)</u>
Profit after tax	2,750

Statement of financial position

	K'000	K'000	K'000
NON CURRENT ASSETS			
Property, plant and equipment			25,000
CURRENT ASSETS			
Inventory	2,000		
Receivables	10,000		
Cash at bank	<u>12,000</u>		
		24,000	
CURRENT LIABILITIES			
Trade payables	2,000		
Bank overdraft	<u>14,000</u>		
		(16,000)	
Net current assets			<u>8,000</u>
NET ASSETS			<u>33,000</u>
EQUITY AND RESERVES			
Ordinary share capital			16,000
Share premium		8,000	
Retained earnings		<u>9,000</u>	
			<u>17,000</u>
TOTAL EQUITY PLUS RESERVES			<u>33,000</u>

Required:

- (a) Calculate the following ratios for Busama Plc and provide relevant comments on your results:
- (i) Return on capital employed
 - (ii) Profit margin
 - (iii) Gross profit percentage
 - (iv) Current ratio

- (v) Quick ratio
- (vi) Receivables collection period
- (vii) Creditors payment period
- (viii) Inventory turnover period
- (ix) Asset turnover period

Assume a 360 day financial year. (19 marks)

- (b) Explain three (3) limitations of ratio analysis. (6 marks)

[TOTAL: 25 Marks]

QUESTION FOUR

The following statements of financial position relate to Bonse Plc and its wholly owned subsidiary, Neka Co for the year ended 31st December, 2014.

	Bonse Plc		Neka Co	
	K'm	K'm	K'm	K'm
Assets:				
Non-current assets				
Property, Plant & Equipment	125		95	
Investment in Neka Co at cost	75		-	
8% loan stock in Neka Co	<u>35</u>	235	<u>-</u>	95
Current Assets:				
Inventories	40		35	
Receivables	55		25	
Current account	15		-	
Cash & cash equivalent	<u>10</u>	<u>120</u>	<u>10</u>	<u>70</u>
Total Assets		<u>355</u>		<u>165</u>

Equity & Liabilities:**Equity**

Ordinary shares of K1 each	110		75	
Retained earnings	<u>90</u>	200	<u>30</u>	105

Non-current liabilities:

10% loan stock		55	15	
8% loan stock	-	<u>35</u>	50	

Current liabilities:

Current account	-		10	
Payables	60		10	
Taxation	<u>40</u>	<u>100</u>	-	<u>20</u>

Total equity & liabilities **355** **175**

Other information

The current account relates to the transactions between Bonse Plc and Neka Co and the difference on the account is as a result of the goods in transit. The ordinary shares in both companies are fully paid. The loan stock for Bonse Plc was issued at par value of K100 and has six years to maturity. It's redeemable at a 5% premium. The pre-tax cost of debt is 15.7% per year. Bonse Plc has just paid a total dividend of K120 million to its shareholders which translate to 5% annual growth. This growth rate is expected to continue in the near future. The equity beta for Bonse Plc is 1.21. The return on Government treasury bills is 7% per year and the equity premium is 9%.

Corporate tax is payable at 30% per annum.

Required:

- (a) State Four (4) conditions that should be satisfied by Bonse Plc for it to be exempt from preparing the consolidated financial statements. (4 marks)
- (b) Prepare the consolidated statement of financial position of Bonse Plc as at 31 December, 2014. (6 marks)
- (c) Calculate the Market value of the loan stock for Bonse Plc. (5 marks)

(d) Estimate the Market value per share of Bonse Plc using the dividend valuation method.
(6 marks)

(e) Distinguish between weak form and semi-strong form of stock market efficiency.

(4 marks)

[Total: 25 Marks]

END OF PAPER

D2 FINANCIAL MANAGEMENT SOLUTIONS

SOLUTION ONE

a)

Year	1	2	3	4	5
Unit selling price by 8%	70.20	75.82	81.88	88.43	95.51
Contribution per unit @40%	28.08	30.33	32.75	35.37	38.20
Number of weeks per yr	52	52	52	52	52
Number of hours per week	40	40	40	40	40
Incremental No. of bags per hour	200	200	200	200	200
	11	12	13	14	15
	713	650	662	755	935
Contribution	371	441	476	475	913
	-2	-3	-3	-3	-3
	928	162	415	688	983
<u>Tax@25%</u>	343	610	619	869	978
					500
Scrap value	-	-	-	-	000
	8	9	10	11	12
Net cash flow	785	487	246	066	451
	029	831	857	606	934
<u>Discount@10%</u>	0.909	0.826	0.751	0.683	0.621
	7	7	7	7	7
Present values	985	836	695	558	732
	591	948	390	492	651
	38				
	809				
Total PV	072				

$$\text{NPV} = \text{K}38,809,072 - \text{K}35,000,000 = \text{K}3,809,072$$

The proposed upgrade is financially viable because the NPV is positive.

Workings:

1. Cost of equity

$$\text{Growth} = 4\sqrt{(4/3.2)} - 1 = 5.74\%$$

$$K_e = 0.4 (1.0574)/6.8 + 0.0574 = 11.96\%$$

2. Cost of Debt

Year	Cash flow	Dis@10%	PV	Dis@5%	PV
0	MV (110)	1.000	(110)	1.000	(110)
1-5	Interest 7.5	3.791	28.43	4.329	32.47
5	Redmp 105	0.621	<u>65.21</u>	0.784	<u>82.32</u>
			<u>(16.36)</u>		<u>4.79</u>

$$\text{Cost of debt} = 5\% + 4.79/4.79 + 16.36 (10\% - 5\%) = 6.13\%$$

3. Market Values

Equity = 5m x K6.8	= K34million	61%
Debt = 110/100 x K20m	= <u>K22million</u>	39%
	<u>K56million</u>	

$$\text{4. Cost of capital} = 0.61 \times 11.96\% + 0.39 \times 6.13\% = 9.7\% \text{ say } 10\%$$

b)

Sensitivity of discount rate

Year	1	2	3	4	5
Net cash flow	8 785 029	9 487 831	10 246 857	11 066 606	12 451 934
<u>Discount@20%</u>	0.833	0.694	0.579	0.482	0.402
Present values	7 317 929	6 584 555	5 932 930	5 334 104	5 005 678
Total PVs	30 175 195				

$$\text{NPV} = K30,175,195 - K35,000,000 = (K4,824,805)$$

$$\text{IRR} = 10\% + 3,809,072/8,633,877 (20\% - 10\%) = 14.4\%$$

$$\text{Sensitivity of discount rate} = 0.144 - 0.10 = 0.044$$

$$= 0.044/0.1 = 44\%$$

Sensitivity of Contribution

Year	1	2	3	4	5
Contribution	11 713 371	12 650 441	13 662 476	14 755 475	15 935 913
<u>Discount@10%</u>	0.909	0.826	0.751	0.683	0.621
Present values	10 647 455	10 449 264	10 260 520	10 077 989	9 896 202
Total PVs	51 331 430				

Sensitivity of contribution = $K3, 809.072/51,331,430 \times 100\% = 7.42\%$

c)

1) **Weakness of NPV**

- i) The net present value is difficult for non-financial managers to understand
- ii) The cost of capital used in discounting cash flows may be difficult to estimate and it changes over the life of the investment.

SOLUTION TWO

To: The Board of Hillcrest woodwork
From: CFO

Subject: Report on the performance of Hillcrest Woodwork

2(i) Comparison of performance with the industry

Profitability

The ROCE of the company of 20% has declined as a result of both falling net profit margin and falling asset turnover to below the industry average of 25% in 2014. This is as a result of sales revenue not improving, despite an increase in the cost of sales and investment in assets.

Liquidity

Despite a fall in profitability, the current ratio has improved. However, it still remains below the industry average. This is mainly due to the increase in inventory days to above the industry average, and a decline in current liabilities. Worsening inventory days may indicate that current products are moving slowly, which can be seen from constant sales revenue and the reduced profit margin. Since revenue is static, the expected increase in sales volume is therefore likely to be associated with a new product launch.

Gearing

The gearing of the company has fallen, and remains below the industry levels because of an increase in retained profits. However, the interest cover has declined since the interest expense has increased and the operating profit has fallen. The increase in the interest expense could indicate an increase in overdraft finance.

2(ii) Effect on gearing and interest cover of proposed loan

The level of gearing will increase from 87.5% to 172.5%, as a result of the additional loan. This is above the industry average of 100%. Consequently, the interest cover will reduce to 3.47. This is still below the industry average.

2(iii) Advantages of financing the machinery with an issue of ordinary shares

Advantages include:

The fact that gearing could fall to 47% (3.5/7.4), less than the sector average of 100%, in comparison to debt which has increased it beyond industry sector averages.

Interest cover would also increase to 5.8 (2.33/0.4), compared to sector averages of 4, reducing the financial risk faced by the company.

Payment of dividends to shareholders is not mandatory, which may improve its liquidity. In addition ordinary shares are permanent capital, since they do not have to be redeemed like debt.

Raising of additional finance is also easier because of the improvement in gearing as a result of additional shares.

Sincerely,
Finance Manager

Appendix

Effect on gearing & interest cover of proposed investment

The current gearing of Hillcrest woodwork	87.5% [3.5/4*100]
Total debt after issuing K3.4 million[3.4m +3.5m]	K6.9m
New level of gearing[6.9m/4m]	172.5%
Current annual loan stock interest[3.5m x 0.10]	350,000
Current interest on overdraft[0.4m – 0.35m]	50,000
Annual interest on new debt[3.4m x 0.08]	272,000
Expected annual interest	<u>672,000</u>
Current profit before interest and tax	K1.5m
Current interest cover 1.5m/0.4m	3.75 times
Additional depreciation on new machine [3m/5years]	0.6m
Annual before tax operating cash flows will be[1.5+1.43-0.6]	K2.33
Expected interest cover[2.33m/.672m]	3.47 times

Comparative ratios

	2014	2013	Industry
Gearing (debt/equity)	87.5% [3,500/4,000*100]	96.7% [3,500/3,620*100]	100%
Interest cover	3.75 [1,500/400]	4.6 [1,750/380]	4 times
Current ratio	1.56 2,000/1,280	1.87 2,150/1,150	2:1
Inventory days	138 days [1,170/3,100*365]	122 days [1,000/3,000*365]	90 days
ROCE (Profit before interest and tax/capital employed)	20% [1,500/7,500]	25% [1,750/7,120]	25%
Net profit margin	30% [1,500/5,000*100]	35% [1,750/5,000*100]	
Asset turnover	0.67 [5,000/7,500]	0.70 [5,000/7,120]	

SOLUTION THREE

Return on capital employed

$$\begin{aligned} &= 4250 + 750 / 33,000 \times 100 \\ &= 5,000 / 33000 \times 100 \\ &= 15.15\% \end{aligned}$$

$$\begin{aligned} \text{Profit margin} &= 5,000 / 25,000 \times 100 \\ &= 20\% \end{aligned}$$

$$\begin{aligned} \text{Gross profit percentage} &= 16,500 / 25,000 \times 100 \\ &= 66\% \end{aligned}$$

$$\text{Current ratio} = 24,000 / 16,000 = 1.5$$

$$\text{Quick ratio} = 24,000 - 2000 / 16,000 = 1.38$$

$$\text{Receivables collection period} = 10000 / 25,000 \times 360 = 146 \text{ days}$$

$$\text{Creditors payment period} = 2,000 / 8,500 \times 360 = 84.7 \text{ days}$$

$$\text{Inventory turnover period} = 2,000 / 8500 \times 360 = 84.7 \text{ days}$$

$$\text{Asset turnover} = 25000 / 33,000 = 75.8 \%$$

LIMITATIONS OF RATIO ANALYSIS

- 1) Availability of comparable information
- 2) Use of historical /out of date information
- 3) Not definitive in nature- they vary industry by industry
- 4) Need for careful interpretation- e.g. high liquidity ratios may be as a result of high inventory levels which could be due to inefficiency in working capital management
- 5) Subject to manipulation due to different accounting treatments e.g. depreciation method used.
- 6) Other information may be necessary for interpreting company accounts.

SOLUTION FOUR

- a) Bonse Plc need not present consolidated financial statements if and only if all of the following hold:
1. Bonse Plc is itself a wholly-owned subsidiary or it is a partially owned subsidiary of another entity and its other owners, including those not otherwise entitled to vote, have been informed about, and do not object to, the parent not presenting consolidated financial statements.
 2. Bonse's securities are not publicly traded.
 3. Bonse Plc is not in the process of issuing securities in public securities markets; and
 4. The ultimate or intermediate parent publishes consolidated financial statements that comply with International Financial Reporting Standards.

A parent that does not present consolidated financial statements must comply with the IAS 27 rules on separate financial statements.

- b) Bonse Plc Consolidated Statement of Financial Position as At 31st December, 2014.

	K'm	K'm
Non-current assets:		
Property, Plant & Equipments (125+95)		220
Current Assets:		
Inventories (40 + 35)	75	
Receivables (55+25)	80	
Goods in transit (15-10)	5	
Cash (10+20)	<u>30</u>	<u>190</u>
Total Assets		<u>410</u>

Equity & Liabilities:

Equity:

Ordinary shares of K1each	110	
Retained earnings (90+30)	<u>120</u>	230
Non-current liabilities:		
10% loan stock (55+15)		70
Current liabilities:		
Payables (60+10)	70	
Taxation	<u>40</u>	<u>110</u>
Total equity & liabilities		<u>410</u>

c)

$$\text{Cost of debt} = 15.7\% \times (1 - 0.3) = 11\%$$

Year		Cash flow	Discount@11%	PV
1-6	Interest (9x0.7)	6.3	4.231	26.66
6	Redeem	105	0.535	<u>56.18</u>
				<u>82.84</u>

$$\text{Market value of loan stock} = 82.84/100 \times K55\text{m} = \mathbf{K45.56\text{million}}$$

d) Dividend per share = $K120\text{m}/110\text{m} = K1.1$ per share
Cost of equity = $7\% + 1.21(9) = 17.89\%$

$$P_0 = 1.1(1.05) / 0.1789 - 0.05 = K8.96 \text{ per share}$$

e)

Stock market efficiency usually refers to the way in which the prices of traded financial securities reflect relevant information. Weak-form efficient is where the share prices fully and fairly reflect past information. Investors cannot generate abnormal returns by analysing past information, such as share price movements in previous time periods.

Semi-strong form of market efficiency is where share prices fully and fairly reflect public information as well as past information. Investors cannot generate abnormal returns by analysing either public information, such as published company reports, or past information.

END OF SOLUTIONS

Formula Sheet

Economic order quantity

$$= \sqrt{\frac{2C_n D}{C_H}}$$

Miller – Orr Model

Return point = Lower limit + $\left(\frac{1}{3} \times \text{spread}\right)$

$$\text{Spread} = 3 \left[\frac{\frac{3}{4} \times \text{transaction cost} \times \text{variance of cash flows}}{\text{interest rate}} \right]^{\frac{1}{3}}$$

The Capital Asset Pricing Model

$$E(r_i) = R_f + \beta_i (E(r_m) - R_f)$$

The asset beta formula

$$\beta_a = \left[\frac{V_e}{(V_e + V_d(1 - T))} \beta_e \right] + \left[\frac{V_d(1 - T)}{(V_e + V_d(1 - T))} \beta_d \right]$$

The Growth Model

$$P_0 = \frac{D_0(1+g)}{(r_e - g)}$$

Gordon's growth approximation

$$g = b r_e$$

The weighted average cost of capital

$$\text{WACC} = \left[\frac{V_e}{V_e + V_d} \right] k_e + \left[\frac{V_d}{V_e + V_d} \right] k_d(1 - T)$$

The Fisher formula

$$(1 + i) = (1 + r)(1 + h)$$

Purchasing power parity and interest rate parity

$$s_1 = S_0 \times \frac{(1 + h_e)}{(1 + h_f)} \qquad f_0 = S_0 \times \frac{(1 + i_e)}{(1 + i_f)}$$

Present Value Table

Present value of 1 i.e. $(1 + r)^{-n}$

Where r = discount rate
 n = number of periods until payment

Periods (n)	Discount rate (r)										
	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909	1
2	0.980	0.961	0.943	0.925	0.907	0.890	0.873	0.857	0.842	0.826	2
3	0.971	0.942	0.915	0.889	0.864	0.840	0.816	0.794	0.772	0.751	3
4	0.961	0.924	0.888	0.855	0.823	0.792	0.763	0.735	0.708	0.683	4
5	0.951	0.906	0.863	0.822	0.784	0.747	0.713	0.681	0.650	0.621	5
6	0.942	0.888	0.837	0.790	0.746	0.705	0.666	0.630	0.596	0.564	6
7	0.933	0.871	0.813	0.760	0.711	0.665	0.623	0.583	0.547	0.513	7
8	0.923	0.853	0.789	0.731	0.677	0.627	0.582	0.540	0.502	0.467	8
9	0.914	0.837	0.766	0.703	0.645	0.592	0.544	0.500	0.460	0.424	9
10	0.905	0.820	0.744	0.676	0.614	0.558	0.508	0.463	0.422	0.386	10
11	0.896	0.804	0.722	0.650	0.585	0.527	0.475	0.429	0.388	0.350	11
12	0.887	0.788	0.701	0.625	0.557	0.497	0.444	0.397	0.356	0.319	12
13	0.879	0.773	0.681	0.601	0.530	0.469	0.415	0.368	0.326	0.290	13
14	0.870	0.758	0.661	0.577	0.505	0.442	0.388	0.340	0.299	0.263	14
15	0.861	0.743	0.642	0.555	0.481	0.417	0.362	0.315	0.275	0.239	15
(n)	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%	
1	0.901	0.893	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833	1
2	0.812	0.797	0.783	0.769	0.756	0.743	0.731	0.718	0.706	0.694	2
3	0.731	0.712	0.693	0.675	0.658	0.641	0.624	0.609	0.593	0.579	3
4	0.659	0.636	0.613	0.592	0.572	0.552	0.534	0.516	0.499	0.482	4
5	0.593	0.567	0.543	0.519	0.497	0.476	0.456	0.437	0.419	0.402	5
6	0.535	0.507	0.480	0.456	0.432	0.410	0.390	0.370	0.352	0.335	6
7	0.482	0.452	0.425	0.400	0.376	0.354	0.333	0.314	0.296	0.279	7
8	0.434	0.404	0.376	0.351	0.327	0.305	0.285	0.266	0.249	0.233	8
9	0.391	0.361	0.333	0.308	0.284	0.263	0.243	0.225	0.209	0.194	9
10	0.352	0.322	0.295	0.270	0.247	0.227	0.208	0.191	0.176	0.162	10
11	0.317	0.287	0.261	0.237	0.215	0.195	0.178	0.162	0.148	0.135	11
12	0.286	0.257	0.231	0.208	0.187	0.168	0.152	0.137	0.124	0.112	12
13	0.258	0.229	0.204	0.182	0.163	0.145	0.130	0.116	0.104	0.093	13
14	0.232	0.205	0.181	0.160	0.141	0.125	0.111	0.099	0.088	0.078	14
15	0.209	0.183	0.160	0.140	0.123	0.108	0.095	0.084	0.074	0.065	15

Annuity Table

Present value of an annuity of 1 i.e. $\frac{1 - (1 + r)^{-n}}{r}$

Where r = discount rate
 n = number of periods

Periods (n)	Discount rate (r)										
	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909	1
2	1.970	1.942	1.913	1.886	1.859	1.833	1.808	1.783	1.759	1.736	2
3	2.941	2.884	2.829	2.775	2.723	2.673	2.624	2.577	2.531	2.487	3
4	3.902	3.808	3.717	3.630	3.546	3.465	3.387	3.312	3.240	3.170	4
5	4.853	4.713	4.580	4.452	4.329	4.212	4.100	3.993	3.890	3.791	5
6	5.795	5.601	5.417	5.242	5.076	4.917	4.767	4.623	4.486	4.355	6
7	6.728	6.472	6.230	6.002	5.786	5.582	5.389	5.206	5.033	4.868	7
8	7.652	7.325	7.020	6.733	6.463	6.210	5.971	5.747	5.535	5.335	8
9	8.566	8.162	7.786	7.435	7.108	6.802	6.515	6.247	5.995	5.759	9
10	9.471	8.983	8.530	8.111	7.722	7.360	7.024	6.710	6.418	6.145	10
11	10.37	9.787	9.253	8.760	8.306	7.887	7.499	7.139	6.805	6.495	11
12	11.26	10.58	9.954	9.385	8.863	8.384	7.943	7.536	7.161	6.814	12
13	12.13	11.35	10.63	9.986	9.394	8.853	8.358	7.904	7.487	7.103	13
14	13.00	12.11	11.30	10.56	9.899	9.295	8.745	8.244	7.786	7.367	14
15	13.87	12.85	11.94	11.12	10.38	9.712	9.108	8.559	8.061	7.606	15
(n)	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%	
1	0.901	0.893	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833	1
2	1.713	1.690	1.668	1.647	1.626	1.605	1.585	1.566	1.547	1.528	2
3	2.444	2.402	2.361	2.322	2.283	2.246	2.210	2.174	2.140	2.106	3
4	3.102	3.037	2.974	2.914	2.855	2.798	2.743	2.690	2.639	2.589	4
5	3.696	3.605	3.517	3.433	3.352	3.274	3.199	3.127	3.058	2.991	5
6	4.231	4.111	3.998	3.889	3.784	3.685	3.589	3.498	3.410	3.326	6
7	4.712	4.564	4.423	4.288	4.160	4.039	3.922	3.812	3.706	3.605	7
8	5.146	4.968	4.799	4.639	4.487	4.344	4.207	4.078	3.954	3.837	8
9	5.537	5.328	5.132	4.946	4.772	4.607	4.451	4.303	4.163	4.031	9
10	5.889	5.650	5.426	5.216	5.019	4.833	4.659	4.494	4.339	4.192	10
11	6.207	5.938	5.687	5.453	5.234	5.029	4.836	4.656	4.486	4.327	11
12	6.492	6.194	5.918	5.660	5.421	5.197	4.988	4.793	4.611	4.439	12
13	6.750	6.424	6.122	5.842	5.583	5.342	5.118	4.910	4.715	4.533	13
14	6.982	6.628	6.302	6.002	5.724	5.468	5.229	5.008	4.802	4.611	14
15	7.191	6.811	6.462	6.142	5.847	5.575	5.324	5.092	4.876	4.675	15