Strategic Professional – Options

Advanced Financial Management (AFM)

September/December 2019 – Sample Questions

AFM ACCA

Time allowed: 3 hours 15 minutes

This question paper is divided into two sections:

Section A – This ONE question is compulsory and MUST be attempted

Section B – BOTH questions are compulsory and MUST be attempted

Formulae and tables are on pages 8–12.

Do NOT open this question paper until instructed by the supervisor.

This question paper must not be removed from the examination hall.

AFM

Think Ahead

ACCA

The Association of Chartered Certified Accountants

Section A – This ONE question is compulsory and MUST be attempted

1 Okan Co, a large listed company located in Yasailand whose currency is the Y$, manufactures engines and engine parts. It is considering whether or not to invest in one of two new four-year projects: Project Alpha or Project Beta. Details of both projects are given separately. Previously, Okan Co has used relevant risk-adjusted discount rates to calculate the net present value (NPV) of projects. However, the finance director believes that calculating adjusted present values (APV) of projects would be more appropriate. Okan Co wants to base its decision on which project to invest in, on the returns generated by the projects, the projects' risk as measured by their project durations, and important non-financial aspects. Both projects are due to commence in six months' time.

Funding for projects Alpha and Beta

Project Alpha or Project Beta will each require the same amount of initial funding of Y$50,000,000.

Proceeds from the sale of a factory based in Europe in six months' time, for Euro (€)10,000,000, will provide part of the funding and the balance will be financed by debt borrowing.

Okan Co expects to hedge the €10,000,000 using either forward markets or money markets. The following information is available on these markets:

Foreign exchange rates

	Y$/€1
Spot	2·5210–2·5862
Six months forward	2·5462–2·6121

Bank interest rates

	Investing	Borrowing
Yasailand	2·40%	5·00%
Eurozone	1·05%	2·20%

The balance of funding raised by domestic debt borrowing will be through a four-year subsidised loan on which interest is payable at 2·1%, although Okan Co's normal borrowing rate is 5%.

Issue costs related to raising this finance will be 3% of the gross proceeds.

Project Alpha details

Project Alpha's base case NPV and APV, in six months' time when the project will commence, should be estimated using the following information.

The sales revenues and production costs related to Project Alpha in six months' time, before any annual price or cost increases, are estimated as follows:

Year	1	2	3	4
Sales revenue (Y$ 000s)	15,750	28,350	47,250	23,100
Production cost (Y$ 000s)	6,120	10,710	21,420	8,160

It is expected that the sales price will increase at an annual inflation rate of 10%. Domestic production costs are likely to increase at Yasailand's annual inflation rate.

In addition to the above, components will be imported from the UK (currency £), at the following current cost:

Year	1	2	3	4
Component costs (£ 000s)	1,200	1,800	3,700	1,400

The costs of components from the UK are fixed and not subject to inflation.

The funds of Y$50,000,000 for Project Alpha will be used to purchase plant and equipment needed for manufacturing purposes. Tax allowable depreciation is available on the value of the plant and equipment at 25% per year on a reducing balance basis, with a balancing allowance or charge applicable at the end of the project. The plant and equipment is expected to be sold for Y$10,000,000 (post-inflation) at the end of the project.

At the start of every year, Project Alpha will require working capital. In the first year this will be 10% of the estimated year 1 sales revenue. In subsequent years, the project will require an increase or a reduction in working capital of 15% for every $1 increase or decrease in sales revenue respectively. The working capital is expected to be fully released when Project Alpha ceases.

The expected spot exchange rate between the Y$ and the £, in six months' time, is expected to be Y$3·03 per £1. The annual inflation rates are currently 2% in the UK and 4% in Yasailand. It can be assumed that these inflation rates will not change for the foreseeable future.

The cost of capital for appraising the base case net present value of Project Alpha is 10%. Okan Co pays tax at an annual rate of 20%. Tax is payable in the same year as the profits it is based on. Okan Co makes sufficient profits from its other activities to take advantage of any tax loss relief.

Project Beta details

Given below are Project Beta's base case present values, based on the project start date in six months' time, discounted at the project's relevant risk-adjusted all-equity financed discount rate:

Year	1	2	3	4
Present values (Y$ 000s)	8,450	19,360	22,340	4,950

It can be assumed that any working capital requirements for Project Beta are included in the annual cash flows.

Project Beta's duration has been calculated as 2·43 years, based on its base case present values.

Economic risk and risk categories

One of Okan Co's subsidiary companies in Yasailand, which produces and sells all its products domestically, has still found that it is exposed to economic risk (economic exposure). The directors of the subsidiary believe that this is because Yasailand's government has maintained comparatively higher interest rates, even though the inflation in Yasailand is now under control.

Okan Co categorises the risks inherent in its projects according to the severity of their impact and the frequency of their occurrence, as follows: (i) severe and frequent, (ii) not severe but frequent, (iii) severe but not frequent, and (iv) neither severe nor frequent.

Required:

(a) Discuss why a company may prefer to use the adjusted present value (APV) method, rather than the net present value (NPV) method. (4 marks)

(b) Prepare a report for the board of directors (BoD) of Okan Co which:

(i) Estimates the minimum amount of debt borrowing Okan Co would require; (4 marks)

(ii) Estimates

- **Project Alpha's and Project Beta's base case NPV, in six months' time, before considering the financing side effects,** (12 marks)
- **Project Alpha's and Project Beta's APV, in six months' time, and** (6 marks)
- **Project Alpha's duration based on its base case present values of cash flows;** (2 marks)

(iii) Evaluates and justifies which project Okan Co should choose, basing the decision on the factors Okan Co considers to be important. The evaluation should include a discussion of the assumptions made. (8 marks)

Professional marks will be awarded in part (b) for the format, structure and presentation of the report. (4 marks)

(c) Discuss why Okan Co's subsidiary company may be exposed to economic risk (economic exposure) and how it may be managed. (4 marks)

(d) Discuss how each category of risk, in terms of severity and frequency, may be managed. (6 marks)

(50 marks)

Section B – BOTH questions are compulsory and MUST be attempted

2 Cadnam Co is a large company in the support services sector.

Cadnam Co's most recent annual report, for the year ended 31 December 20X5, acknowledged challenges for the company, including financing the major investment programme required to meet its clients' increasing expectations. Cadnam Co also faced upward pressure on employment costs, fuelled by a 'fair wage' campaign which adversely compared wage rises in the support services sector with increases in dividends and directors' remuneration, and a consequent government enquiry into low pay in the sector.

Cadnam Co's board, however, was confident that the company would be able to renew a number of large contracts which were coming up for review. The report stressed the strength of Cadnam Co's senior management team as a vital success factor. Directors' remuneration packages thus reflected the need to retain its directors in a competitive labour market at senior level.

In the stakeholder engagement section of its annual report, Cadnam Co highlighted that it had fulfilled its aim of guaranteeing investors a consistent rise in dividends and its board was confident that Cadnam Co would be able to maintain the recent rate of dividend increase. The report also stated that Cadnam Co was looking to publish a full integrated report over the next couple of years.

Dividend policy

At Cadnam Co's last annual general meeting, there were no questions about the level of profits, dividends or directors' remuneration. However, a recent investment analysts' report on the support services sector highlighted Cadnam Co as a company which might have problems in the next few years. The report suggested that Cadnam Co's investment and dividend policies could not both be maintained. It highlighted one of Cadnam Co's principal competitors, Holmsley Co, as a company whose policies it believed would sustain long-term growth. It highlighted directors' remuneration as an area where Holmsley Co's policies were more likely to encourage long-term value creation and share price increases than Cadnam Co's policies.

Cadnam Co's board is currently considering the comments made by the investment analysts, and also assessing what the dividend for 20X6 should be.

Cadnam Co

	20X2 $m	20X3 $m	20X4 $m	20X5 $m
Profit after tax	1,380	1,490	1,550	1,580
Dividends	765	840	925	1,020
Investment in additional assets	282	312	584	864
Share price ($)	$4·88	$5·35	$5·61	$5·75
Gearing (debt/(debt + equity)) (market value) x 100%	33·0%	33·2%	35·0%	38·8%

Holmsley Co

	20X2 $m	20X3 $m	20X4 $m	20X5 $m
Profit after tax	1,485	1,590	1,700	1,830
Dividends	560	590	621	654
Investment in additional assets	595	625	660	690
Share price	$5·04	$5·23	$5·55	$5·93
Gearing (debt/(debt + equity)) (market value) x 100%	35·1%	35·2%	34·9%	34·7%

Average gearing in the support services sector since 20X1 has been stable at around 34%. There have been no changes in the issued share capital of Cadnam Co and Holmsley Co since 20X1.

Directors' remuneration

	Cadnam Co	Holmsley Co
Average salary executive director	$550,000	$550,000
Performance bonus	Maximum 25% of salary	Maximum 30% of salary
Loyalty bonus	Maximum 10% of salary	None
Share options	None	Options to be exercised on 31 December 20X8 at an exercise price of $7·00

Cadnam Co 20X6 forecast

Forecasts prepared by Cadnam Co's finance director for 20X6 predict that:

- Cadnam Co's pre-tax operating profit for 20X6 will be $2,678m, an increase of 3% compared with 20X5. The operating profit margin will be 2%, the same as for 20X5.
- The tax rate will be 30%.
- Average debt in 20X6 will be $10,250m and predicted year-end gearing will be 41·3%. The average pre-tax interest rate on the debt will be 8%.
- The investment required to keep the non-current asset base at its present productive capacity in 20X6 will be $2,430m, which has been included in the calculation of operating profit as depreciation.
- Investment required in additional assets in 20X6 will be $0·25 for every $1 increase in revenue.

Required:

(a) Calculate the forecast dividend capacity of Cadnam Co for 20X6. (5 marks)

(b) Discuss the viability and financial impacts of Cadnam Co seeking to maintain its current dividend policy, supporting your answers with relevant calculations.

Note: 6 marks are available for calculations in part (b). (12 marks)

(c) Discuss the governance and ethical issues associated with Cadnam Co's dividend and directors' remuneration policies. (8 marks)

(25 marks)

3 A new client has approached you for advice on a potential acquisition. Kerrin Co is a consumer electronics manufacturer and retailer. The company obtained a listing eight years ago with the founders retaining a 20% stake in the business. Whilst Kerrin Co had previously experienced rapid growth in earnings before tax, problems arose soon after the listing as competition intensified. Although the company remains profitable, annual growth has declined significantly and is currently 3%.

The board is concerned by the lack of future growth opportunities. The current share price reflects these concerns, trading well below the offer price of eight years ago. In response, the directors have decided to invest in a market development strategy for future growth, utilising significant cash reserves to acquire companies in other areas of the country where competition is less intense. The board has identified a potential target, Danton Co.

Danton Co

Danton Co is a privately owned consumer electronics company, established ten years ago. Significant unrelieved losses were incurred in the early years of development although the company is now profitable and achieving growth in earnings before tax of 6% per year. However, cash reserves are low. Access to capital has acted as a severe constraint on Danton Co's reinvestment potential throughout this period. The founders and their families own 60% of the shares with the balance held by a venture capitalist organisation, which acquired its equity stake around six years ago.

Acquisition information

Kerrin Co's board is keen to ensure that Danton Co's founders remain as directors after the acquisition and the company has sufficient cash reserves to purchase Danton Co outright.

Early discussions between the directors of both companies suggest Danton Co's shareholders would approve a cash offer of $13·10 per share. As an alternative, the board is considering a share-for-share exchange to fund the acquisition in order to preserve cash for future acquisitions and dividend payments. Recent mergers have attracted an acquisition premium of around 25%–30% and Danton Co's directors indicated their shareholders would be expecting a premium towards the higher end of this scale for a share-for-share offer. Kerrin Co has therefore asked you to design a share-for-share offer scheme which will allow for a 30% acquisition premium. You have been provided with extracts from the latest financial statements for both companies.

Extracts from the most recent financial statements

	Kerrin Co $m	Danton Co $m
Operating profit	448·6	201·8
Earnings before tax	381·9	116·3

Additional financial information

The book value of Kerrin Co's $0·50 ordinary shares is $375m. These shares are currently trading at $5·28 and the finance director expects the price earnings (PE) ratio to increase by 10% if the acquisition proceeds.

Danton Co upgraded its main manufacturing facility during the previous year and expects to make annual pre-tax cost savings of $2·5m from the start of the current financial year. The book value of Danton Co's $0·25 ordinary shares is $35m. Based on an analysis of companies of a comparable size and cost structure, it is estimated that Danton Co's PE ratio is 20% higher than Kerrin Co's current PE ratio.

Kerrin Co's chief executive officer estimates annual pre-tax revenue and cost synergies of $15·2m to arise as a result of the acquisition. In addition, the finance director anticipates annual pre-tax financial synergies of $5·3m although she insists this is a cautious estimate after reading an article on recent merger and acquisition activity where post-acquisition synergies have either been overestimated or failed to materialise.

The rate of corporation tax relevant to both companies is 20%.

Required:

(a) Discuss possible sources of financial synergy arising from Kerrin Co's acquisition of Danton Co and comment on the finance director's concern that synergy is often overestimated, including any steps which could be taken by Kerrin Co's board to address this problem. (8 marks)

(b) Advise the directors on a suitable share-for-share exchange offer which meets the criteria specified by Danton Co's shareholders and calculate the effect of the cash and share-for-share offers on the post-acquisition wealth of both Kerrin Co's and Danton Co's shareholders. (13 marks)

(c) Discuss the likely reaction of Kerrin Co's and Danton Co's shareholders to the cash and share-for-share offers. (4 marks)

(25 marks)

Formulae

Modigliani and Miller Proposition 2 (with tax)

$$k_e = k_e^i + (1 - T)(k_e^i - k_d)\frac{V_d}{V_e}$$

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

$$P_o = \frac{D_o(1+g)}{(r_e - g)}$$

Gordon's growth approximation

$$g = br_e$$

The weighted average cost of capital

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

The Fisher formula

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

Purchasing power parity and interest rate parity

$$S_1 = S_0 x \frac{(1+h_c)}{(1+h_b)} \qquad F_0 = S_0 x \frac{(1+i_c)}{(1+i_b)}$$

Modified Internal Rate of Return

$$MIRR = \left[\frac{PV_R}{PV_I}\right]^{\frac{1}{n}}\left(1 + r_e\right) - 1$$

The Black-Scholes option pricing model

$$c = P_a N(d_1) - P_e N(d_2)e^{-rt}$$

Where:

$$d_1 = \frac{\ln(P_a / P_e) + (r + 0.5s^2)t}{s\sqrt{t}}$$

$$d_2 = d_1 - s\sqrt{t}$$

The Put Call Parity relationship

$$p = c - P_a + P_e e^{-rt}$$

Present Value Table

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

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

Discount rate (r)

Periods (n)	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

Discount rate (r)

Periods (n)	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	10·368	9·787	9·253	8·760	8·306	7·887	7·499	7·139	6·805	6·495	11
12	11·255	10·575	9·954	9·385	8·863	8·384	7·943	7·536	7·161	6·814	12
13	12·134	11·348	10·635	9·986	9·394	8·853	8·358	7·904	7·487	7·103	13
14	13·004	12·106	11·296	10·563	9·899	9·295	8·745	8·244	7·786	7·367	14
15	13·865	12·849	11·938	11·118	10·380	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

[P.T.O.

Standard normal distribution table

	0·00	0·01	0·02	0·03	0·04	0·05	0·06	0·07	0·08	0·09
0·0	0·0000	0·0040	0·0080	0·0120	0·0160	0·0199	0·0239	0·0279	0·0319	0·0359
0·1	0·0398	0·0438	0·0478	0·0517	0·0557	0·0596	0·0636	0·0675	0·0714	0·0753
0·2	0·0793	0·0832	0·0871	0·0910	0·0948	0·0987	0·1026	0·1064	0·1103	0·1141
0·3	0·1179	0·1217	0·1255	0·1293	0·1331	0·1368	0·1406	0·1443	0·1480	0·1517
0·4	0·1554	0·1591	0·1628	0·1664	0·1700	0·1736	0·1772	0·1808	0·1844	0·1879
0·5	0·1915	0·1950	0·1985	0·2019	0·2054	0·2088	0·2123	0·2157	0·2190	0·2224
0·6	0·2257	0·2291	0·2324	0·2357	0·2389	0·2422	0·2454	0·2486	0·2517	0·2549
0·7	0·2580	0·2611	0·2642	0·2673	0·2704	0·2734	0·2764	0·2794	0·2823	0·2852
0·8	0·2881	0·2910	0·2939	0·2967	0·2995	0·3023	0·3051	0·3078	0·3106	0·3133
0·9	0·3159	0·3186	0·3212	0·3238	0·3264	0·3289	0·3315	0·3340	0·3365	0·3389
1·0	0·3413	0·3438	0·3461	0·3485	0·3508	0·3531	0·3554	0·3577	0·3599	0·3621
1·1	0·3643	0·3665	0·3686	0·3708	0·3729	0·3749	0·3770	0·3790	0·3810	0·3830
1·2	0·3849	0·3869	0·3888	0·3907	0·3925	0·3944	0·3962	0·3980	0·3997	0·4015
1·3	0·4032	0·4049	0·4066	0·4082	0·4099	0·4115	0·4131	0·4147	0·4162	0·4177
1·4	0·4192	0·4207	0·4222	0·4236	0·4251	0·4265	0·4279	0·4292	0·4306	0·4319
1·5	0·4332	0·4345	0·4357	0·4370	0·4382	0·4394	0·4406	0·4418	0·4429	0·4441
1·6	0·4452	0·4463	0·4474	0·4484	0·4495	0·4505	0·4515	0·4525	0·4535	0·4545
1·7	0·4554	0·4564	0·4573	0·4582	0·4591	0·4599	0·4608	0·4616	0·4625	0·4633
1·8	0·4641	0·4649	0·4656	0·4664	0·4671	0·4678	0·4686	0·4693	0·4699	0·4706
1·9	0·4713	0·4719	0·4726	0·4732	0·4738	0·4744	0·4750	0·4756	0·4761	0·4767
2·0	0·4772	0·4778	0·4783	0·4788	0·4793	0·4798	0·4803	0·4808	0·4812	0·4817
2·1	0·4821	0·4826	0·4830	0·4834	0·4838	0·4842	0·4846	0·4850	0·4854	0·4857
2·2	0·4861	0·4864	0·4868	0·4871	0·4875	0·4878	0·4881	0·4884	0·4887	0·4890
2·3	0·4893	0·4896	0·4898	0·4901	0·4904	0·4906	0·4909	0·4911	0·4913	0·4916
2·4	0·4918	0·4920	0·4922	0·4925	0·4927	0·4929	0·4931	0·4932	0·4934	0·4936
2·5	0·4938	0·4940	0·4941	0·4943	0·4945	0·4946	0·4948	0·4949	0·4951	0·4952
2·6	0·4953	0·4955	0·4956	0·4957	0·4959	0·4960	0·4961	0·4962	0·4963	0·4964
2·7	0·4965	0·4966	0·4967	0·4968	0·4969	0·4970	0·4971	0·4972	0·4973	0·4974
2·8	0·4974	0·4975	0·4976	0·4977	0·4977	0·4978	0·4979	0·4979	0·4980	0·4981
2·9	0·4981	0·4982	0·4982	0·4983	0·4984	0·4984	0·4985	0·4985	0·4986	0·4986
3·0	0·4987	0·4987	0·4987	0·4988	0·4988	0·4989	0·4989	0·4989	0·4990	0·4990

This table can be used to calculate $N(d)$, the cumulative normal distribution functions needed for the Black-Scholes model of option pricing. If $d_i > 0$, add 0·5 to the relevant number above. If $d_i < 0$, subtract the relevant number above from 0·5.

End of Question Paper