

**ACCA FINAL ASSESSMENT**

**Advanced Financial  
Management**

**December 2011**

Time allowed    Reading time: **15 minutes**  
Writing time:    **3 hours**

**Answer BOTH questions in section A and TWO questions in section B**

**Do not open this paper until instructed by the supervisor**

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

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**Paper P4**

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## SECTION A

### Answer BOTH questions

#### QUESTION 1

Extracts from the annual report of Noifa Leisure plc, a UK listed company, are shown below:

##### *Chairman's report*

'The group's financial position has never been stronger. Turnover has risen 209% and the share price has almost doubled during the last four years, between 20X6 and 20X9. Since the end of the financial year the company has acquired Beddall Hotels for £100 million, financed at only 9% per year by a Euro floating rate loan which has little risk. Our objective is to become the largest hotel group in the United Kingdom within five years.'

##### **Income statement summaries for the years ending 31 December**

	20X6	20X7	20X8	20X9
	£m	£m	£m	£m
Turnover	<u>325</u>	<u>370</u>	<u>490</u>	<u>680</u>
Operating profit	49	60	75	92
Investment income	<u>18</u>	<u>10</u>	<u>3</u>	<u>1</u>
	67	70	78	93
Interest payable	<u>14</u>	<u>16</u>	<u>24</u>	<u>36</u>
Profit before tax	53	54	54	57
Taxation	<u>20</u>	<u>19</u>	<u>19</u>	<u>20</u>
Profit after taxation	33	35	35	37
Exceptional items <sup>1</sup>	<u>(3)</u>	<u>–</u>	<u>–</u>	<u>4</u>
Profit attributable to shareholders	30	35	35	41
Dividends	<u>12</u>	<u>12</u>	<u>12</u>	<u>12</u>
Retained earnings	<u>18</u>	<u>23</u>	<u>23</u>	<u>29</u>

<sup>1</sup>Loss/gain on disposal of non-current assets

**Statement of financial position summaries as at 31 December**

	20X6 £m	20X7 £m	20X8 £m	20X9 £m
Non-current assets				
Tangible assets	165	260	424	696
Investments	120	68	20	4
	<u>285</u>	<u>328</u>	<u>444</u>	<u>700</u>
Current assets				
Inventory	40	45	70	110
Receivables	56	52	75	94
Cash	2	3	4	5
	<u>98</u>	<u>100</u>	<u>149</u>	<u>209</u>
<b>TOTAL ASSETS</b>	<u>383</u>	<u>428</u>	<u>593</u>	<u>909</u>
Equity:				
Ordinary shares (10 pence nominal value)	50	50	50	50
Share premium	22	22	22	22
Revaluation reserve	–	–	–	100
Revenue reserves	74	97	120	149
	<u>146</u>	<u>169</u>	<u>192</u>	<u>321</u>
Shareholders' funds	146	169	192	321
Long term liabilities:				
Bank loans	42	42	102	102
13% debenture (9 years to redemption)	80	80	80	180
Current liabilities				
Trade payables	82	94	130	176
Taxation	18	19	19	20
Overdraft	–	–	42	68
Other	15	24	28	42
	<u>115</u>	<u>137</u>	<u>199</u>	<u>286</u>
<b>TOTAL EQUITY AND LIABILITIES</b>	<u>383</u>	<u>428</u>	<u>593</u>	<u>909</u>

**Analysis by type of activity**

	20X6		20X7		20X8		20X9	
	Turnover £m	Profit <sup>1</sup> £m	Turnover £m	Profit £m	Turnover £m	Profit £m	Turnover £m	Profit £m
Hotels	196	36	227	41	314	37	471	45
Theme park	15	(3)	18	(2)	24	3	34	5
Bus company	24	6	28	8	38	14	46	18
Car hire	43	7	45	8	52	12	62	15
Zoo <sup>2</sup>	5	(1)	6	(1)	9	0	10	(1)
Waxworks	10	1	11	3	13	4	14	5
Publications	32	3	35	3	40	5	43	5
	<u>325</u>	<u>49</u>	<u>370</u>	<u>60</u>	<u>490</u>	<u>75</u>	<u>680</u>	<u>92</u>

(1) <sup>1</sup>Operating profit before taxation.(2) <sup>2</sup>The zoo was sold during 20X9.

	20X6	20X7	20X8	20X9
Noifa plc average share price (pence)	82	104	120	159
FT 100 Share Index	1,500	1,750	1,800	2,300
Leisure industry share index	178	246	344	394
Leisure industry PE ratio	10:1	12:1	19:1	25:1

**Required:**

**In his report the chairman stated that 'the group's financial position has never been stronger.' From the viewpoint of an external consultant appraise whether you agree with the chairman. Discussion of the group's financing policies and strategic objective, with suggestions as to how these might be altered, should form part of your appraisal.**

**Relevant calculations must be shown.**

**(Total: 30 marks)**

**QUESTION 2**

PCO Inc operates in oil and related industries. Its shares are quoted on a major Stock Exchange. In its retailing operations the company has concentrated on providing high-quality service and facilities at its service stations rather than competing solely on the price of petrol. Approximately 75% of its revenue and 60% of its profits are from petrol, the remainder coming from other services (car wash and retail sales from its convenience stores which are available at each service station).

The company has been highly profitable in the past as a result of astute buying of petroleum products on the open market. The company does not enter into supplier agreements with the major oil companies except on very short-term deals. However, profit margins are now under increasing pressure as a result of intensifying competition and the cost of complying with environmental legislation.

The managing director of the company is assessing a possible acquisition that would help the company increase the percentage of its non-petroleum revenue and profits. OT Inc specialises in oil distribution from the depots owned by the major oil companies to their retail outlets. Its shares have been quoted on a smaller Stock Market (similar to the Alternative Investment Market in the UK) for the past two years. It operates a fleet of oil tankers, some owned and some leased. PCO Inc has used its services in the past and knows it has an up-to-date and well-managed fleet. However, a bid for OT Inc would almost certainly be hostile and, as the directors and their families own 40% of the shares, a successful bid is far from assured.

**Extracts from PCO Inc's balance sheet (statement of financial position) at 31 December 20X3**

	\$M
<b>Assets</b>	
Property, plant and equipment	160.00
Cash and marketable securities	105.00
Accounts receivable and inventories	95.00
	360.00
<b>Equity and liabilities</b>	
Share capital (authorised \$50 million)	
Issued	40.00
Accumulated profits	165.00
	205.00
Total equity	205.00
Secured loan stock 7% repayable 20X9	80.00
Current liabilities	75.00
	360.00

PCO Inc's financial advisors have produced estimates of the expected NPV and the first full year post-acquisition earnings of PCO Inc and OT Inc:

	<i>Estimated post-acquisition earnings in first full year following acquisition</i>	<i>Estimated NPV of combined organisation</i>
PCO Inc plus OT Inc	\$70 million	\$720 million

	<b>Summary financial statistics</b>	
	PCO Inc	OT Inc
	<i>31 December 20X3</i>	<i>31 December 20X3</i>
Last year end		
Shares in issue (millions)	40	24
Earnings per share (cents)	106	92
Dividend per share (cents)	32	21
Share price (cents)	967	1,020
Book value of non-current and current assets less current liabilities (\$ million)	285	145
Debt ratio (outstanding debt as % of total market value)	17.0	14.0
Forecast growth rate % (constant, annualised)	5	9
Beta co-efficient	0.9	1.2

**Required:**

- (a) Calculate, for PCO Inc and OT Inc before the acquisition:
- (i) the current market value and P/E ratio
  - (ii) the cost of equity using the CAPM, assuming the return on the market is 8% and the return on the risk-free asset is 4%
  - (iii) the prospective share price and market value using the dividend valuation model. (8 marks)
- (b) Prepare some briefing notes for the managing director which cover the following issues:
- (i) the price to be offered to the target company's shareholders. You should recommend a range of terms within which PCO Inc should be prepared to negotiate
  - (ii) the most appropriate form of funding the bid and the financial effects (assume cash or share exchange are the options)
  - (iii) the business implications (effect on existing operation, growth prospects, risk and so on). (22 marks)

Marks are split roughly equally between sections of part (b) of the question.  
(Total: 30 marks)

## SECTION B

### ANSWER TWO QUESTIONS ONLY

#### QUESTION 3

Assume that it is now mid-December.

The finance director of Shawter plc, a UK-based company, has recently reviewed the company's monthly cash budgets for the next year. As a result of buying new machinery in three months' time, the company is expected to require short-term financing of £30 million for a period of two months until the proceeds from a factory disposal become available. The finance director is concerned that, as a result of increasing wage settlements, the Central Bank will increase interest rates in the near future.

LIBOR is currently 6% per annum and Shawter can borrow at LIBOR + 0.9%.

Derivative contracts may be assumed to mature at the end of the month.

Three types of hedge are available:

#### Three months sterling future (£500,000 contract size, £12.50 tick size)

December	93.870
March	93.790
June	93.680

#### Options on three months sterling futures

(£500,000 contract size, premium cost in annual %)

	<i>Calls</i>			<i>Puts</i>		
	<i>December</i>	<i>March</i>	<i>June</i>	<i>December</i>	<i>March</i>	<i>June</i>
93750	0.120	0.195	0.270	0.020	0.085	0.180
94000	0.015	0.075	0.115	0.165	0.255	0.335
94250	0	0.030	0.085	0.400	0.480	0.555

#### FRA prices:

3 v 6	7.01 – 6.91
3 v 5	7.08 – 7.00
3 v 8	7.28 – 7.20

#### Required:

Prepare a report for the finance director, which:

- (i) briefly discusses the relative advantages and disadvantages of the three types of hedge;
- (ii) illustrates how the short-term interest risk might be hedged, and the possible results of the alternative hedges, if interest rates increase by 0.5%.

All relevant calculations must be shown.

(20 marks)



**QUESTION 4**

You are employed in the derivatives markets division of a leading international bank and you have responsibility for the following client portfolio:

Client A requires a call option on 4,000 ordinary shares in Lambley plc. The option is a European option and will be exercisable in 3 months time. An exercise price of £1.50 has been requested.

The following data is available:

Current share price of Lambley's shares	£1.80
Risk free interest rate	10% pa
Standard deviation (volatility) of Lambley's shares	50% pa

Client B owns 10,000 shares in Lambley plc and, because of the current market uncertainty, wishes to construct a risk less hedge for these shares.

Client C wishes to purchase a European put option on 2,000 Lambley plc shares, exercise price £1.50 for 3 month exercise.

Client D has been studying the prices of \$/£ call options and requires you to outline the determinants of the option premiums on these instruments.

**Required:**

- (a) Calculate the value/premium of the call option on 4000 shares in Lambley plc for client A. (7 marks)
- (b) Demonstrate for client B how a delta hedge could be constructed to protect his position. (2 marks)
- (c) Calculate the premium you would quote client C for a put option on 2000 shares in Lambley plc. (4 marks)
- (d) Briefly outline the determinants of the premium for a call option on sterling options. (7 marks)

**(Total: 20 marks)**

## QUESTION 5

Helders Co is a medium sized company which provides training courses for aspiring professional musicians. As well as training students in key aspects of musicianship, Helders provides advice on how to prepare demo recordings and how to find suitable roles within bands and orchestras around the world. Over the last 2 years, student numbers have declined and the turnover of Helders has fallen from \$28.84m in 2006 to \$22.63m in 2008. Consequently, the directors are considering various cost reduction proposals which they hope will enable the company to remain profitable.

### Proposal 1: Staff cuts

Helders currently employs 220 full-time staff, comprising 140 musicians who work as lecturers and mentors to the students, and 80 administrative staff. The Chief Executive has proposed that these staff numbers should be reduced by 20%, initially by offering redundancy packages to all staff members. To encourage employees to accept the redundancy, a standard package of \$30,000 cash is to be offered to all staff irrespective of seniority and experience.

### Proposal 2: Pension fund changes

Helders currently operates a non-contributory final salary pension scheme, into which Helders invested \$2.43m last year. The Finance Director has proposed that this should be discontinued. In its place, he is proposing to introduce a "money purchase" scheme into which the company will pay 3% of salary if the employee also agrees to pay in 3%.

### Proposal 3: Course programme changes

The Training Director has proposed that the course programmes could be adapted in order to save money. Instead of providing an average of 20 hours per week in contact time (lectures and practical workshops), he is proposing to offer only 15 hours per week, but leaving the course fees unchanged. This saving of 25% of the lecturers' time will enable Helders to reduce its reliance on freelance lecturers and musicians which are currently used at busy times of year to supplement the full-time staff. Most of the freelance staff have worked for Helders for many years, but they do not have formal contracts with the company, so the Training Director's proposal would involve cancelling any freelance agreements with immediate effect.

### Proposal 4: Aggressive marketing

Part of the reason for the decline in Helders' business has been that a competitor, Turner Co, has started offering cheaper, online courses which have proved successful with Helders' students. The Marketing Director has proposed that Helders should launch an aggressive marketing campaign, emphasising the quality of the courses offered by Helders, but at the same time disparaging the quality of the Turner courses and lecturers.

### Required:

**Assume that you are the assistant to the Finance Director.**

**Prepare a paper for discussion at the next Board meeting, which discusses the ethical, financial and strategic implications of the four proposals. You should assume for the purposes of your paper that the four proposals are mutually exclusive. Include in your discussion any improvements which you think would make the proposals more ethically acceptable.**

**(Total: 20 marks)**

## MATHEMATICAL TABLES

### FORMULAE AND TABLES

Modigliani and Miller Proposition 2 (with tax)

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

Two asset portfolio

$$s_p = \sqrt{w_a^2 s_a^2 + w_b^2 s_b^2 + 2w_a w_b r_{ab} s_a s_b}$$

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

$$g = br_e$$

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

$$s_1 = s_0 \times \frac{(1 + h_c)}{(1 + h_b)} \quad f_0 = s_0 \times \frac{(1 + i_c)}{(1 + i_b)}$$

Modified internal rate of return

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

**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

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
2	0.980	0.961	0.943	0.925	0.907	0.890	0.873	0.857	0.842	0.826
3	0.971	0.942	0.915	0.889	0.864	0.840	0.816	0.794	0.772	0.751
4	0.961	0.924	0.888	0.855	0.823	0.792	0.763	0.735	0.708	0.683
5	0.951	0.906	0.863	0.822	0.784	0.747	0.713	0.681	0.650	0.621
6	0.942	0.888	0.837	0.790	0.746	0.705	0.666	0.630	0.596	0.564
7	0.933	0.871	0.813	0.760	0.711	0.665	0.623	0.583	0.547	0.513
8	0.923	0.853	0.789	0.731	0.677	0.627	0.582	0.540	0.502	0.467
9	0.914	0.837	0.766	0.703	0.645	0.592	0.544	0.500	0.460	0.424
10	0.905	0.820	0.744	0.676	0.614	0.558	0.508	0.463	0.422	0.386
11	0.896	0.804	0.722	0.650	0.585	0.527	0.475	0.429	0.388	0.350
12	0.887	0.788	0.701	0.625	0.557	0.497	0.444	0.397	0.356	0.319
13	0.879	0.773	0.681	0.601	0.530	0.469	0.415	0.368	0.326	0.290
14	0.870	0.758	0.661	0.577	0.505	0.442	0.388	0.340	0.299	0.263
15	0.861	0.743	0.642	0.555	0.481	0.417	0.362	0.315	0.275	0.239

  

Periods (n)	Discount rate (r)									
	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
2	0.812	0.797	0.783	0.769	0.756	0.743	0.731	0.718	0.706	0.694
3	0.731	0.712	0.693	0.675	0.658	0.641	0.624	0.609	0.593	0.579
4	0.659	0.636	0.613	0.592	0.572	0.552	0.534	0.516	0.499	0.482
5	0.593	0.567	0.543	0.519	0.497	0.476	0.456	0.437	0.419	0.402
6	0.535	0.507	0.480	0.456	0.432	0.410	0.390	0.370	0.352	0.335
7	0.482	0.452	0.425	0.400	0.376	0.354	0.333	0.314	0.296	0.279
8	0.434	0.404	0.376	0.351	0.327	0.305	0.285	0.266	0.249	0.233
9	0.391	0.361	0.333	0.308	0.284	0.263	0.243	0.225	0.209	0.194
10	0.352	0.322	0.295	0.270	0.247	0.227	0.208	0.191	0.176	0.162
11	0.317	0.287	0.261	0.237	0.215	0.195	0.178	0.162	0.148	0.135
12	0.286	0.257	0.231	0.208	0.187	0.168	0.152	0.137	0.124	0.112
13	0.258	0.229	0.204	0.182	0.163	0.145	0.130	0.116	0.104	0.093
14	0.232	0.205	0.181	0.160	0.141	0.125	0.111	0.099	0.088	0.078
15	0.209	0.183	0.160	0.140	0.123	0.108	0.095	0.084	0.074	0.065

## 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
2	1.970	1.942	1.913	1.886	1.859	1.833	1.808	1.783	1.759	1.736
3	2.941	2.884	2.829	2.775	2.723	2.673	2.624	2.577	2.531	2.487
4	3.902	3.808	3.717	3.630	3.546	3.465	3.387	3.312	3.240	3.170
5	4.853	4.713	4.580	4.452	4.329	4.212	4.100	3.993	3.890	3.791
6	5.795	5.601	5.417	5.242	5.076	4.917	4.767	4.623	4.486	4.355
7	6.728	6.472	6.230	6.002	5.786	5.582	5.389	5.206	5.033	4.868
8	7.652	7.325	7.020	6.733	6.463	6.210	5.971	5.747	5.535	5.335
9	8.566	8.162	7.786	7.435	7.108	6.802	6.515	6.247	5.995	5.759
10	9.471	8.983	8.530	8.111	7.722	7.360	7.024	6.710	6.418	6.145
11	10.368	9.787	9.253	8.760	8.306	7.887	7.499	7.139	6.805	6.495
12	11.255	10.575	9.954	9.385	8.863	8.384	7.943	7.536	7.161	6.814
13	12.134	11.348	10.635	9.986	9.394	8.853	8.358	7.904	7.487	7.103
14	13.004	12.106	11.296	10.563	9.899	9.295	8.745	8.244	7.786	7.367
15	13.865	12.849	11.938	11.118	10.380	9.712	9.108	8.559	8.061	7.606

  

Periods (n)	Discount rate (r)									
	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
2	1.713	1.690	1.668	1.647	1.626	1.605	1.585	1.566	1.547	1.528
3	2.444	2.402	2.361	2.322	2.283	2.246	2.210	2.174	2.140	2.106
4	3.102	3.037	2.974	2.914	2.855	2.798	2.743	2.690	2.639	2.589
5	3.696	3.605	3.517	3.433	3.352	3.274	3.199	3.127	3.058	2.991
6	4.231	4.111	3.998	3.889	3.784	3.685	3.589	3.498	3.410	3.326
7	4.712	4.564	4.423	4.288	4.160	4.039	3.922	3.812	3.706	3.605
8	5.146	4.968	4.799	4.639	4.487	4.344	4.207	4.078	3.954	3.837
9	5.537	5.328	5.132	4.946	4.772	4.607	4.451	4.303	4.163	4.031
10	5.889	5.650	5.426	5.216	5.019	4.833	4.659	4.494	4.339	4.192
11	6.207	5.938	5.687	5.453	5.234	5.029	4.836	4.656	4.486	4.327
12	6.492	6.194	5.918	5.660	5.421	5.197	4.968	4.793	4.611	4.439
13	6.750	6.424	6.122	5.842	5.583	5.342	5.118	4.910	4.715	4.533
14	6.982	6.628	6.302	6.002	5.724	5.468	5.229	5.008	4.802	4.611
15	7.191	6.811	6.462	6.142	5.847	5.575	5.324	5.092	4.876	4.675

## Standard Normal Distribution Table

	.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2703	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4430	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4980	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990

This table can be used to calculate  $N(d_1)$ , the cumulative normal distribution functions needed for the Black-Scholes model of option pricing. If  $d_1 > 0$ , add 0.5 to the relevant number above. If  $d_1 < 0$ , subtract the relevant number above from 0.5.

