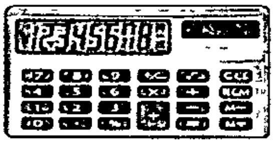
UNIVERSITY EXAMINATIONS



UNIVERSITEITSEKSAMENS

UNISA university of south africa

INV3703 (495361) May/June 2014

INVESTMENTS. DERIVATIVES

Duration 2 Hours 70 Marks

EXAMINERS
FIRST MR CF ERASMUS
SECOND MR G MAROZVA
EXTERNAL MS M REYERS

Use of a non-programmable pocket calculator is permissible

Closed book examination

A non-programmable financial and/or a scientific calculator is permissible

This paper consists of 22 pages, including two pages for rough work (pp 17 – 18), the standard normal distribution table (p 19), a formula sheet (pp 20 – 22), and instructions for completing a mark-reading sheet

INSTRUCTIONS

Complete section A on the mark-reading sheet provided Write your student number and the unique number on the mark-reading sheet

UNIQUE NUMBER: 495361

Complete sections B, C, D and E on the examination paper
Assume all risk-free rates as discrete unless stated otherwise
Round all answers to at least 4 decimals and your final answer to 2 decimals

Mark allocation for the paper

Section A	10 multiple-choice questions	**[20 marks]**
Section B	Forwards and Futures	**[20 marks]**
Section C	Options	**[15 marks]**
Section D.	Swaps	**[10 marks]**
Section E	Theory and application	**[5 marks]**
Total		**[70 marks]**

SECTION A: MULTIPLE-CHOICE QUESTIONS [10 x 2 marks = 20 marks]

1 Which one of the following is a characteristic of an exchange traded derivative?

1 Bears credit risk
2 Standardized
3 Unregulated
4 Illiquid

2 Mark took a long position in a call option, what would *most likely* be the advantage of engaging in this contingent claim compared to a forward commitment?

1 Contingent claims permit gains while protecting against losses
2 Contingent claims are easier to offset than forward commitments
3 Contingent claims have lower default risk than forward commitments
4 Contingent claims are typically cheaper to initiate than forward commitments

3 A call for delivery of a 90-day T-bill with a $1 notional par value in 60 days sells for $0 9859, the implied discount rate for the T-bill would be closest to

1 1 41%
2 1 88%
3 2 82%
4 5 64%

4 A 3 × 6 FRA contract

1 expires in 3 months based on a 60-day LIBOR rate
2 expires in 3 months based on a 90-day LIBOR rate
3 expires in 6 months based on a 90-day LIBOR rate
4 expires in 6 months based on a 180-day LIBOR rate

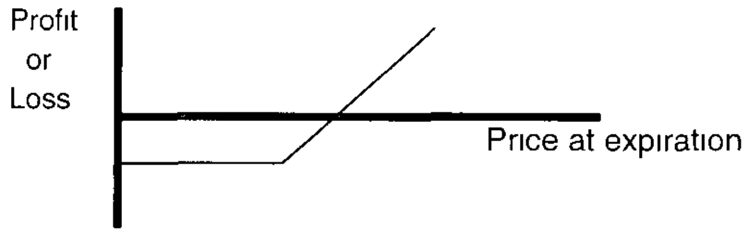
5 A Eurodollar futures price changes from 99 02 to 99 09 The gain or loss to an investor who is long four contracts is closest to

1 –$700
2 –$175
3 $175
4 $700

6 A five-year Treasury bond with a par value of $1000, 7% annual yield and a 10% semi-annual coupon is priced at $1124 75 A futures contract calling for delivery of the bond expires one year from now The one-year risk-free rate is 6% The futures price would be closest to

1 $ 983 69
2 $ 985 44
3 $1000 00
4 $1090 48

7 The following option diagram represents a



1 Long put
2 Long call
3 Short put
4 Short call

8 An analyst is currently pricing an option using the Black-Scholes option pricing model The calculated value for $d_1 = -0\ 53$ The value of $N(d_1)$ would be closest to

1. 0 2981
2 0 3192
3 0 6808
4 0 7019

9 A U S based company exchanges $14 000 for €10 000 with an European company If you were to value the swap at initiation of this contract, the value of the transaction would be

1 $0
2 $14 000 paid by the US company and €10 000 paid by the European company
3 $14 000 paid by the US company and €10 000 received by the European company
4 unable to be determined as no exchange rate is provided

10 A British company enters into a currency swap in which it pays a fixed rate of 6 percent in dollars and the counterparty pays a floating rate of LIBOR+2 5 percent in pounds The notional principals are £20 million and $30 million Payments are made quarterly and on the basis of 30 days per month and 360 days per year Calculate the quarterly payments if the LIBOR rates are as follow.

90-day LIBOR rate	2 50%
360-day LIBOR rate	5 5%

	Dollar payment	**Pounds payment**
1	$300 000	£375 000
2	$375 000	£300 000
3	$1 200 000	£1 500 000
4	$1 500 000	£1 200 000

SECTION B: FORWARDS AND FUTURES (20 marks)

1 Fikile, the head of treasury at Sanral, wishes to hedge against an increase in borrowing costs due to a possible downgrade in Sanrals' credit rating Fikile proposes to the management of Sanral to hedge the risk by entering into a long 6 × 12 FRA The current structure for LIBOR is as follows

Term	Interest rate
30 day	6 15%
90 day	6 30%
180 day	6 60%
360 day	6 95%

1 1 Calculate the rate that Fikile would receive on a 6 × 12 FRA (3)
(Show all calculations Only the calculations will be marked in this question)

1 2 Suppose Fikile went long in the FRA and the FRA rate is 0 0707 Now 55 days later the interest rates have risen and the LIBOR term structure is as follows

Term	Interest rate
125 day	6 65%
305 day	7 24%

Calculate the market value of this FRA based on a notional principal of R50 000 000 (4)

2 Eskom expects to receive a cash inflow of £200 000 000 in 90 days to fund an alternative energy project The economist in the treasury department expects short-term interest rates to decrease during the next 90 days The economist advises the treasurer of Eskom to enter into a FRA that expires in 90 days and that is based on the 90-day LIBOR rate A dealer quoted this FRA at 6 per cent At expiration the LIBOR rate is 5 per cent Assume a notional principal on the contract of £200 000 000

2 1 Thandi, the head of treasury, is uncertain of the position she should take on the FRA to hedge against the interest rate risk Would you recommend a short or a long position and why would you recommend this position? (2)

2 2 Calculate whether Eskom made a gain or a loss as a consequence of entering the FRA (3)

3 Platinum currently trades at $1224 46 per ounce in the spot market The risk-free interest rate is 7 per cent Assume the net cost of carry for platinum futures is zero

3 1 Calculate the price of a platinum futures contract that expires in 135 days (1)

3 2 Use your answer calculated in 3 1 and illustrate how an arbitrage transaction could be executed if the platinum futures contract is priced at $1261 13 per ounce (5)

4 A copper futures contract requires the long trader to buy 100 tonnes of copper The initial margin is $2 000 and the maintenance margin requirement is $1 500

4 1 Alicia sells one August copper futures contract at a futures price of $323 per tonne When would Alicia receive a maintenance margin call? (2)

SECTION C: OPTIONS (15 marks)

1 Ciska, an analyst at Anna List Investments collects the following information on call and put prices of a share

Call price	\$ 5 60
Put price	\$ 6 60
Share price	\$85 00
Exercise price	\$88 00
Risk-free rate	6 per cent
Days to expiration	239

Assume a 365 day year

1 1 Use put-call parity to calculate the price of the synthetic put option (1)

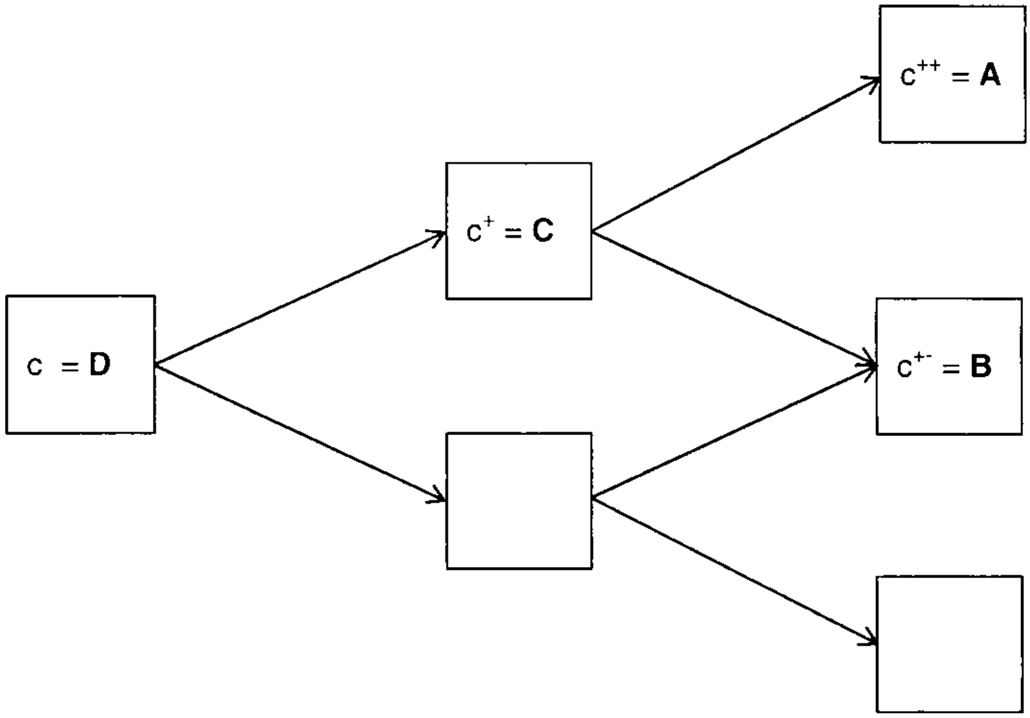
1 2 Use put-call parity to calculate the price of the synthetic underlying share (1)

1 3 If the value of the share is $90 at expiration, indicate how you will derive an arbitrage profit by using a synthetic call (4)

2 A two-period binomial model with a share that currently trades at $50 in the spot market can either increase in value by 20 per cent or decrease by 20 per cent in the highly volatile market The annual risk-free rate is 8 per cent and each period of the binomial model is equal to one year

2 1 Calculate the risk-neutral probability of the binomial model (2)

2 2 Use the diagram below to find the European call option values of A, B, C, and D if the strike price for this option is $57 (4)



A = __________

B = __________

C = __________

D = __________

Calculations

3 A Barclays Africa (BGA) share is currently trading at R133 15, call and put options associated with this share have an exercise price of R145 00 These options expire in 129 days and the volatility is 0 48 The continuously compounded risk-free interest rate is 4 per cent Before the analyst could finish the option pricing he had to leave his desk but left you with the correct values for d_1 = -0 11 and d_2 = -0 39

3 1 Calculate the value of the European call option on a BGA share. (3)

SECTION D: SWAPS (10 marks)

1 Vodacom (JSE VOD), has issued its first 2 year ZAR denominated bond with a coupon rate set at 6%, which means that Vodacom pays a fixed rate of interest in ZAR for the next two years However Vodacom would prefer to have a USD liability as it believes the USD will weaken against the ZAR over the next two years

AT&T (NYSE T), has issued a 2 year USD denominated bond with a coupon rate of 4%, which means that AT&T pays a fixed rate of interest in USD for the next two years However AT&T would prefer to have a ZAR liability as it believes the USD will strengthen against the ZAR over the next two years

The companies decide to enter into a swap, the terms of which are contained in table below

Contract date	1 July 2014
Contract type	Currency swap (fixed for fixed)
ZAR Fixed rate payer	Vodacom
USD Fixed rate payer	AT&T
Start date	1 July 2014
Maturity date	1 July 2016
Notional principal	ZAR 10 000 000
ZAR Fixed interest rate per annum	6%
USD Fixed interest rate per annum	4%
Payment date	1 July of each year

1 1 The exchange rate was ZAR10 00/USD at the initiation of the swap Indicate the cash flows between the companies from the perspective of AT&T mobile (4)

Cash flows paid and received by AT&T mobile

Date	**USD cash flow**	**ZAR cash flow**
1 July 2014		
1 July 2015		
1 July 2016		

[TURN OVER]

1 2 Identify the type of risk either company, Vodacom or AT&T, may incur as a result of the swap contract Briefly explain the potential effect of this risk (2)

2 An asset manager wishes to reduce his exposure to large-cap stocks and increase his exposure to small cap stocks He seeks to do so using an equity swap He agrees to pay a dealer the return on a large-cap index, and the dealer agrees to pay the manager the return on a small-cap index The value of the small-cap index starts off at 712 70, and the large-cap index starts at 1230 10 In six months, the small-cap index is at 653 30 and the large-cap index is at 1270 92 Assume that payments are made semi-annually

2 1 If the notional principal is R10 million, calculate the first overall payment and indicate which party makes the payment (4)

SECTION E: THEORY AND APPLICATION (5 marks)

1 If a trader would enter into a derivative transaction where s/he pays a premium to buy an underlying asset at a predetermined price sometime in the future, which derivative would the trader hold and what is the position that the trader took? (2)

2 If a futures price is lower than the expected spot price the situation is called normal (1)

3 Swaptions are options on a swap contract There are two types of swaptions, a payer swaption and receiver swaptions Briefly explain which rate is paid and which rate is received by a trader who entered a **receiver swaption** (2)

TOTAL **[70 MARKS]**

ROUGH WORK (WILL NOT BE MARKED)

ROUGH WORK (WILL NOT BE MARKED)

Cumulative probabilities for a standard normal distribution

P(X ≤ x) = N(x) for x ≥ 0 or 1 – N(– x) for x < 0

x	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.00	0 5000	0 5040	0 5080	0 5120	0 5160	0 5199	0 5239	0 5279	0 5319	0 5359
0.10	0 5398	0 5438	0 5478	0 5517	0 5557	0 5596	0 5636	0 5675	0 5714	0 5753
0.20	0 5793	0 5832	0 5871	0 5910	0 5948	0 5987	0 6026	0 6064	0 6103	0 6141
0.30	0 6179	0 6217	0 6255	0 6293	0 6331	0 6368	0 6406	0 6443	0 6480	0 6517
0.40	0 6554	0 6591	0 6628	0 6664	0 6700	0 6736	0 6772	0 6808	0 6844	0 6879
0.50	0 6915	0 6950	0 6985	0 7019	0 7054	0 7088	0 7123	0 7157	0 7190	0 7224
0.60	0 7257	0 7291	0 7324	0 7357	0 7389	0 7422	0.7454	0 7486	0 7517	0 7549
0.70	0 7580	0 7611	0 7642	0 7673	0 7704	0 7734	0 7764	0 7794	0 7823	0 7852
0.80	0 7881	0 7910	0 7939	0 7967	0 7995	0 8023	0 8051	0 8078	0 8106	0 8133
0.90	0 8159	0 8186	0 8212	0 8238	0 8264	0 8289	0 8315	0 8340	0 8365	0 8389
1.00	0 8413	0 8438	0 8461	0 8485	0 8508	0 8531	0 8554	0 8577	0 8599	0 8621
1.10	0 8643	0 8665	0 8686	0 8708	0 8729	0 8749	0 8770	0 8790	0 8810	0 8830
1.20	0 8849	0 8869	0 8888	0 8907	0 8925	0 8944	0 8962	0 8980	0 8997	0 9015
1.30	0 9032	0 9049	0 9066	0 9082	0 9099	0 9115	0 9131	0 9147	0 9162	0 9177
1.40	0 9192	0 9207	0 9222	0 9236	0 9251	0 9265	0 9279	0 9292	0 9306	0 9319
1.50	0 9332	0 9345	0 9357	0.9370	0 9382	0 9394	0 9406	0 9418	0 9429	0 9441
1.60	0 9452	0 9463	0 9474	0 9484	0 9495	0 9505	0 9515	0 9525	0 9535	0 9545
1.70	0 9554	0 9564	0 9573	0 9582	0 9591	0 9599	0 9608	0 9616	0 9625	0 9633
1.80	0 9641	0 9649	0 9656	0 9664	0 9671	0 9678	0 9686	0 9693	0 9699	0 9706
1.90	0 9713	0 9719	0 9726	0 9732	0 9738	0 9744	0 9750	0 9756	0 9761	0 9767
2.00	0 9772	0 9778	0 9783	0 9788	0 9793	0 9798	0 9803	0 9808	0 9812	0 9817
2.10	0 9821	0 9826	0 9830	0 9834	0 9838	0 9842	0 9846	0 9850	0 9854	0 9857
2.20	0 9861	0 9864	0 9868	0 9871	0 9875	0 9878	0 9881	0.9884	0 9887	0 9890
2.30	0 9893	0 9896	0 9898	0 9901	0 9904	0 9906	0 9909	0 9911	0 9913	0 9916
2.40	0 9918	0 9920	0 9922	0 9925	0 9927	0 9929	0 9931	0 9932	0 9934	0 9936
2.50	0 9938	0 9940	0 9941	0 9943	0 9945	0 9946	0 9948	0 9949	0 9951	0 9952
2.60	0 9953	0 9955	0 9956	0 9957	0 9959	0 9960	0 9961	0 9962	0 9963	0 9964
2.70	0 9965	0 9966	0 9967	0 9968	0 9969	0 9970	0 9971	0 9972	0 9973	0 9974
2.80	0 9974	0 9975	0 9976	0 9977	0 9977	0 9978	0 9979	0 9979	0 9980	0 9981
2.90	0 9981	0 9982	0 9982	0 9983	0 9984	0 9984	0 9985	0 9985	0 9986	0 9986
3.00	0 9987	0 9987	0 9987	0 9988	0 9988	0 9989	0 9989	0 9989	0 9990	0 9990

PRICING AND VALUATION OF FORWARD

Discrete interest (r)

$(1+r)^T$

Continuous interest (r^c)

e^{r^cT}

Conversion ($r \leftrightarrow r^c$)

$r^c = \ln(1+r)$

$r = e^{r^c} - 1$

Discount interest

$\text{Amount}\left[1 - r(d/360)\right]$

Add-on interest

$\text{Amount}\left[1 + r(d/360)\right]$

Forward rate agreement (FRA)

Price/rate

$$FRA_{rate} = \left[\frac{1+L_0\left(\frac{h+m}{360}\right)}{1+L_0\left(\frac{h}{360}\right)} - 1\right]\left(\frac{360}{m}\right)$$

Value

$$V_g = \left[\frac{1}{1+L_g\left(\frac{h-g}{360}\right)}\right] - \left[\frac{1+FRA_{rate}\left(\frac{m}{360}\right)}{1+L_g\left(\frac{h+m-g}{360}\right)}\right]$$

Payoff

$$FRA_{payoff} = NP\left[\frac{\left(U_{rate} - FRA_{rate}\right)\left(\frac{U_{days}}{360}\right)}{1+U_{rate}\left(\frac{U_{days}}{360}\right)}\right]$$

Forward contract – no cash flows

Price

$F_T = S_0(1+r)^T$

Value

$V_0 = S_0 - \frac{F_T}{(1+r)^T}$ $\quad V_t = S_t - \frac{F_T}{(1+r)^{T-t}}$

Forward contract – equity

Price and value – discrete compounding

$F_T = \left[S_0 - PV(D)\right](1+r)^T$

$V_t = S_t - PV(D) - \left[\frac{F_T}{(1+r)^{T-t}}\right]$

Price and value – continuous compounding

$F_T = S_0 e^{(r^c - \delta^c)T}$

$V_t = S_t e^{-\delta(T-t)} - F_T e^{-r(T-t)}$

Forward contract – fixed income

Price and value

$F_T = \left[B_0 - PV(C)\right](1+r)^T$

$V_t = B_t - PV(C) - \left[\frac{F_T}{(1+r)^{T-t}}\right]$

Forward contract – currency

Price and value – discrete compounding

$F_T = S_0\left[\frac{(1+r_d)^{d/365}}{(1+r_f)^{d/365}}\right]$

$V_t = \left[\frac{S_t}{(1+r_f)^{T-t}}\right] - \left[\frac{F_T}{(1+r_d)^{T-t}}\right]$

Price and value – continuous compounding

$F_T = S_0 e^{(r_d^c - r_f^c)(d/365)}$

$V_t = S_t e^{-r_f^c(T-t)} - F_T e^{-r_d^c(T-t)}$

Interest rate parity (IRP)

$(1+r_d)^{d/365} = (1+r_f)^{d/365}\left(\frac{F}{S}\right)$

PRICING OF FUTURES

Futures price – no cost or benefit

$$f_0(T) = S_0(1+r)^T$$

Futures price – net cost or benefit

$$f_0(T) = S_0(1+r)^T + FV(CB)$$

Futures price – stock

$$f_0(T) = S_0(1+r)^T - FV(D)$$

Futures price – stock index

$$f_0(T) = S_0 e^{(r^c - \delta^c)T}$$

Futures price – Treasury bill

$$f_0(T) = \frac{B_0(1+r)^T - FV(C)}{\text{Conversion Factor}}$$

Futures price – currency

Discrete compounding

$$f_0(T) = S_0\left[\frac{(1+r_d)^{d/365}}{(1+r_f)^{d/365}}\right]$$

Continuous compounding

$$f_0(T) = S_0 e^{(r_d^c - r_f^c)(d/365)}$$

PRICING AND VALUATION OF SWAPS

Net fixed payment

$$NFP = (\text{swap rate} - \text{LIBOR})\left(\frac{\text{days}}{360}\right)NP$$

Swap fixed rate

$$C = \left(\frac{1 - Z_4}{Z_1 + Z_2 + Z_3 + Z_4}\right)$$

Discount rate

$$Z_{day} = \frac{1}{1 + \left(R_{day} \times \frac{\text{days}}{360}\right)}$$

Market value of interest rate swap

$$MV_{IRS} = V_{\text{floating-rate bond}} - V_{\text{fixed-rate bond}}$$

Market value of currency swap

$$MV_{CS} = V_{\text{domestic bond}} - V_{\text{foreign bond}}$$

Return on equity

$$\text{Return} = \left(\frac{\text{Ending value}}{\text{Beginning value}}\right)$$

Yield on equity

$$\text{Yield} = \left(\frac{\text{Ending value}}{\text{Beginning value}}\right) - 1$$

Payment on equity position

$$PMT = \text{Yield} \times NP$$

Market value of equity swap

$$MV_{ES} = NP(\text{Return}_X - \text{Return}_Y)$$

Swaption payoffs

$$\text{Payoff}_{\text{Swaption-payer}} = (SFR - X)\left(\frac{\text{days}}{360}\right)NP$$

$$\text{Payoff}_{\text{Swaption-receiver}} = (X - SFR)\left(\frac{\text{days}}{360}\right)NP$$

PRICING OF OPTION CONTRACTS

Intrinsic values

$$c = \max[0, (S - X)]$$

$$p = \max[0, (X - S)]$$

Bounds – European options

No cash flows – upper and lower

$$\left[S - X(1+r)^{-t}\right] \le c \le S$$

$$\left[X(1+r)^{-t} - S\right] \le p \le X(1+r)^{-t}$$

Cash flows – lower bounds

$c \geq [S - PV(CF)] - PV(X)$

$p \geq PV(X) - [S - PV(X)]$

Bounds – American options

$[S - X(1+r)^{-t}] \leq C \leq S$

$(X - S) \leq P \leq X$

Put-call parity – European options

No cash flows

$S + p = c + X(1+r)^{-t}$

Cash flows

$[S - PV(CF)] + p = c + PV(X)$

Futures contracts

$F_T(1+r)^{-t} + p = c + X(1+r)^{-t}$

Put-call parity – American options

$S - X \leq C - P \leq S - X(1+r)^{-t}$

Binomial model

$$p = \frac{(1+r) - d}{u - d}$$

$$f = \frac{[(p)(f^{+}) + (1-p)(f^{-})]}{(1+r)}$$

$$f = \frac{[(p)^2(f^{++}) + 2(p)(1-p)(f^{+-}) + (1-p)^2(f^{--})]}{(1+r)^2}$$

Black-Scholes Merton model

Black-Scholes model

$$d_1 = \frac{\ln(S/X) + [r^c + (\sigma^2/2)]T}{\sigma\sqrt{T}}$$

$$d_2 = d_1 - \sigma\sqrt{T}$$

$$c = SN(d_1) - Xe^{-r^cT}N(d_2)$$

$$p = Xe^{-r^cT}N(-d_2) - SN(-d_1)$$

Merton's model

$$d_1 = \frac{\ln(S/X) + [(r^c - \delta) + (\sigma^2/2)]T}{\sigma\sqrt{T}}$$

$$d_2 = d_1 - \sigma\sqrt{T}$$

$$c = Se^{-\delta T}N(d_1) - Xe^{-r^cT}N(d_2)$$

$$p = Xe^{-r^cT}N(-d_2) - Se^{-\delta T}N(-d_1)$$

[$r^c = r_d^c$ and $\delta = r_f^c$ when pricing currency options]

Black's model

$$d_1 = \frac{\ln(F/X) + (\sigma^2/2)T}{\sigma\sqrt{T}}$$

$$d_2 = d_1 - \sigma\sqrt{T}$$

$$c = e^{-r^cT}[FN(d_1) - XN(d_2)]$$

$$p = e^{-r^cT}[XN(-d_2) - FN(-d_1)]$$

Delta

$$\text{Delta} = \frac{f_1 - f_0}{S_1 - S_0} = N(d_1)$$

Interest rate options

$$IR_{call} = NP(U_{rate} - X_{rate})\left(\frac{d}{360}\right)$$

$$IR_{put} = NP(X_{rate} - U_{rate})\left(\frac{d}{360}\right)$$

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EXAMINATION MARK READING SHEET — EKSAMEN-MERKLEESBLAD

PART 1 (GENERAL/ALGEMEEN) DEEL 1

STUDY UNIT e.g. PSY100-X / STUDIE-EENHEID bv PSY100-X ❶ [| | | | | | - |]

INITIALS AND SURNAME / VOORLETTERS EN VAN ❸ ____________________

PAPER NUMBER / VRAESTELNOMMER ❷ [ ]

DATE OF EXAMINATION / DATUM VAN EKSAMEN ❹ ____________________

EXAMINATION CENTRE (E G PRETORIA) / EKSAMENSENTRUM (BV PRETORIA) ❺ ____________________

STUDENT NUMBER / STUDENTENOMMER ❻ ❼

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[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]
[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]
[5]	[5]	[5]	[5]	[5]	[5]	[5]	[5]
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[7]	[7]	[7]	[7]	[7]	[7]	[7]	[7]
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UNIQUE PAPER NO / UNIEKE VRAESTEL NR ❽ ❾

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[3]	[3]	[3]	[3]	[3]	[3]
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[5]	[5]	[5]	[5]	[5]	[5]
[6]	[6]	[6]	[6]	[6]	[6]
[7]	[7]	[7]	[7]	[7]	[7]
[8]	[8]	[8]	[8]	[8]	[8]
[9]	[9]	[9]	[9]	[9]	[9]

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Vir gebruik deur eksamenopsiener
◆

IMPORTANT

1. USE ONLY AN HB PENCIL TO COMPLETE THIS SHEET
2. MARK LIKE THIS [2]
3. CHECK THAT YOUR INITIALS AND SURNAME HAS BEEN FILLED IN CORRECTLY
4. ENTER YOUR STUDENT NUMBER FROM LEFT TO RIGHT
5. CHECK THAT YOUR STUDENT NUMBER HAS BEEN FILLED IN CORRECTLY
6. CHECK THAT THE UNIQUE NUMBER HAS BEEN FILLED IN CORRECTLY
7. CHECK THAT ONLY ONE ANSWER PER QUESTION HAS BEEN MARKED
8. DO NOT FOLD

BELANGRIK

1. GEBRUIK SLEGS 'N HB POTLOOD OM HIERDIE BLAD TE VOLTOOI
2. MERK AS VOLG [2]
3. KONTROLEER DAT U VOORLETTERS EN VAN REG INGEVUL IS
4. VUL U STUDENTENOMMER VAN LINKS NA REGS IN
5. KONTROLEER DAT U DIE KORREKTE STUDENTENOMMER VERSTREK HET
6. KONTROLEER DAT DIE UNIEKE NOMMER REG INGEVUL IS
7. MAAK SEKER DAT NET EEN ALTERNATIEF PER VRAAG GEMERK IS
8. MOENIE VOU NIE

PART 2 (ANSWERS/ANTWOORDE) DEEL 2

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1	[1] [2] [3] [4] [5]	36	[1] [2] [3] [4] [5]	71	[1] [2] [3] [4] [5]	106	[1] [2] [3] [4] [5]
2	[1] [2] [3] [4] [5]	37	[1] [2] [3] [4] [5]	72	[1] [2] [3] [4] [5]	107	[1] [2] [3] [4] [5]
3	[1] [2] [3] [4] [5]	38	[1] [2] [3] [4] [5]	73	[1] [2] [3] [4] [5]	108	[1] [2] [3] [4] [5]
4	[1] [2] [3] [4] [5]	39	[1] [2] [3] [4] [5]	74	[1] [2] [3] [4] [5]	109	[1] [2] [3] [4] [5]
5	[1] [2] [3] [4] [5]	40	[1] [2] [3] [4] [5]	75	[1] [2] [3] [4] [5]	110	[1] [2] [3] [4] [5]
6	[1] [2] [3] [4] [5]	41	[1] [2] [3] [4] [5]	76	[1] [2] [3] [4] [5]	111	[1] [2] [3] [4] [5]
7	[1] [2] [3] [4] [5]	42	[1] [2] [3] [4] [5]	77	[1] [2] [3] [4] [5]	112	[1] [2] [3] [4] [5]
8	[1] [2] [3] [4] [5]	43	[1] [2] [3] [4] [5]	78	[1] [2] [3] [4] [5]	113	[1] [2] [3] [4] [5]
9	[1] [2] [3] [4] [5]	44	[1] [2] [3] [4] [5]	79	[1] [2] [3] [4] [5]	114	[1] [2] [3] [4] [5]
10	[1] [2] [3] [4] [5]	45	[1] [2] [3] [4] [5]	80	[1] [2] [3] [4] [5]	115	[1] [2] [3] [4] [5]
11	[1] [2] [3] [4] [5]	46	[1] [2] [3] [4] [5]	81	[1] [2] [3] [4] [5]	116	[1] [2] [3] [4] [5]
12	[1] [2] [3] [4] [5]	47	[1] [2] [3] [4] [5]	82	[1] [2] [3] [4] [5]	117	[1] [2] [3] [4] [5]
13	[1] [2] [3] [4] [5]	48	[1] [2] [3] [4] [5]	83	[1] [2] [3] [4] [5]	118	[1] [2] [3] [4] [5]
14	[1] [2] [3] [4] [5]	49	[1] [2] [3] [4] [5]	84	[1] [2] [3] [4] [5]	119	[1] [2] [3] [4] [5]
15	[1] [2] [3] [4] [5]	50	[1] [2] [3] [4] [5]	85	[1] [2] [3] [4] [5]	120	[1] [2] [3] [4] [5]
16	[1] [2] [3] [4] [5]	51	[1] [2] [3] [4] [5]	86	[1] [2] [3] [4] [5]	121	[1] [2] [3] [4] [5]
17	[1] [2] [3] [4] [5]	52	[1] [2] [3] [4] [5]	87	[1] [2] [3] [4] [5]	122	[1] [2] [3] [4] [5]
18	[1] [2] [3] [4] [5]	53	[1] [2] [3] [4] [5]	88	[1] [2] [3] [4] [5]	123	[1] [2] [3] [4] [5]
19	[1] [2] [3] [4] [5]	54	[1] [2] [3] [4] [5]	89	[1] [2] [3] [4] [5]	124	[1] [2] [3] [4] [5]
20	[1] [2] [3] [4] [5]	55	[1] [2] [3] [4] [5]	90	[1] [2] [3] [4] [5]	125	[1] [2] [3] [4] [5]
21	[1] [2] [3] [4] [5]	56	[1] [2] [3] [4] [5]	91	[1] [2] [3] [4] [5]	126	[1] [2] [3] [4] [5]
22	[1] [2] [3] [4] [5]	57	[1] [2] [3] [4] [5]	92	[1] [2] [3] [4] [5]	127	[1] [2] [3] [4] [5]
23	[1] [2] [3] [4] [5]	58	[1] [2] [3] [4] [5]	93	[1] [2] [3] [4] [5]	128	[1] [2] [3] [4] [5]
24	[1] [2] [3] [4] [5]	59	[1] [2] [3] [4] [5]	94	[1] [2] [3] [4] [5]	129	[1] [2] [3] [4] [5]
25	[1] [2] [3] [4] [5]	60	[1] [2] [3] [4] [5]	95	[1] [2] [3] [4] [5]	130	[1] [2] [3] [4] [5]
26	[1] [2] [3] [4] [5]	61	[1] [2] [3] [4] [5]	96	[1] [2] [3] [4] [5]	131	[1] [2] [3] [4] [5]
27	[1] [2] [3] [4] [5]	62	[1] [2] [3] [4] [5]	97	[1] [2] [3] [4] [5]	132	[1] [2] [3] [4] [5]
28	[1] [2] [3] [4] [5]	63	[1] [2] [3] [4] [5]	98	[1] [2] [3] [4] [5]	133	[1] [2] [3] [4] [5]
29	[1] [2] [3] [4] [5]	64	[1] [2] [3] [4] [5]	99	[1] [2] [3] [4] [5]	134	[1] [2] [3] [4] [5]
30	[1] [2] [3] [4] [5]	65	[1] [2] [3] [4] [5]	100	[1] [2] [3] [4] [5]	135	[1] [2] [3] [4] [5]
31	[1] [2] [3] [4] [5]	66	[1] [2] [3] [4] [5]	101	[1] [2] [3] [4] [5]	136	[1] [2] [3] [4] [5]
32	[1] [2] [3] [4] [5]	67	[1] [2] [3] [4] [5]	102	[1] [2] [3] [4] [5]	137	[1] [2] [3] [4] [5]
33	[1] [2] [3] [4] [5]	68	[1] [2] [3] [4] [5]	103	[1] [2] [3] [4] [5]	138	[1] [2] [3] [4] [5]
34	[1] [2] [3] [4] [5]	69	[1] [2] [3] [4] [5]	104	[1] [2] [3] [4] [5]	139	[1] [2] [3] [4] [5]
35	[1] [2] [3] [4] [5]	70	[1] [2] [3] [4] [5]	105	[1] [2] [3] [4] [5]	140	[1] [2] [3] [4] [5]