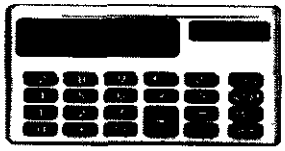
UNIVERSITY EXAMINATIONS



UNIVERSITEITSEKSAMENS

UNISA university of south africa

# INV3703 (470172) May/June 2012

## INVESTMENTS: DERIVATIVES

Duration 2 Hours 40 Marks

EXAMINERS :

| | |
|---|---|
| FIRST | MR G MAROZVA |
| SECOND | MISS E BOTHA |
| EXTERNAL | MR JS DE BEER |

**Use of a non-programmable pocket calculator is permissible**



This paper consists of 21 pages, including the Standard Normal Distribution table (pp 15) and six sheets of paper for rough work (pp 16-21) and the instructions for completing a mark-reading sheet All 40 questions must be answered on the mark-reading sheet

Indicate your student number and the correct unique number on the mark-reading sheet.

Unique number **470172**

NB. PLEASE COMPLETE THE ATTENDANCE REGISTER ON THE BACK PAGE, TEAR IT OFF AND HAND IT TO THE INVIGILATOR.

1 Which of the following is most representative of option contracts and forward commitments?

| | Option contracts | Forward commitments |
|---|---|---|
| 1 | No Premium paid at inception | No premium paid at inception |
| 2 | No Premium paid at inception | Premium paid at inception |
| 3. | Long party has an obligation to exercise | Long party has the right to exercise |
| 4 | Premium paid at inception | Short has obligation to perform |

2 Which of the following is least likely a similarity between a forward rate agreement based on LIBOR + 200 basis points and an interest rate option on LIBOR?

1 A long position in either one of the positions will result in a positive payment if interest rates increase above the contract rate
2 The payments to either are based on the difference between the contract rate and the market rate
3 If both have the same contract rate, notional principal, expiration date, and reference rate they will make equal payments to their (long) owners
4 The reference rate for either of these contracts is LIBOR

3 The following information is available for a security

Current price = R77
Risk-free rate = 7.5%

A dealer offers you a forward contract for delivery in three months on the security at a price of R76. How would you earn an arbitrage profit?

1 Buy the forward contract, borrow money and buy the stock
2. Sell the forward contract, borrow money and buy the stock
3 Buy the forward contract, sell the stock and invest the proceeds
4 Sell the forward contract, sell the stock and invest the proceeds

4 What will happen to a party who is *short in a* bond forward position if market interest rates increases?

1 A short, will have losses
2 A short, will have profits
3. A short, will have a right not to perform
4. A short will have his/her position unchanged.

5 A customised agreement to purchase a certain Treasury security next Friday for R950 is

1 An option
2. A futures contract
3 A Contingent claim
4. A Forward commitment

*Use the following information to answer questions 6 and 7:*

Suppose a 8% bond originally issued with a maturity of 5-years It is now 130 days after the bond was issued and the current dirty price of the bond is R 1,500 00 Given that the first coupon occurs 183 days after the issue, the second 365 days, the third 545 days, fourth 730 days, and fifth 913 days. The risk-free rate is currently 5%.

6 At what price could the owner enter into a forward contract to sell the bond on the day after its fifth coupon?

1 R1, 456 53
2 R1, 455 55
3 R1, 418 48
4 R1, 461 18

7 Assuming, we move forward 492 days from now The risk free rate is 8% and the new price is R1,382 25. Determine the value of the forward contract and the gain or loss to the counterpart at this time

| | | |
|---|---|---|
| 1 | R62 35 | R125 35 |
| 2. | R63 11 | -R63 11 |
| 3. | R100 00 | R100 00 |
| 4 | R65 11 | -R65 11 |

8 Godezhy P/L is expecting to borrow R14,000,000 00 in 90 days Short term interest rates are expected to increase during the next 90 days In order to hedge against this risk, the company decides to use an FRA that expires in 90 days and is based on 90 day LIBOR The FRA is quoted at 4% At expiration LIBOR is 7% Indicate whether the company should take a long or short position to hedge interest rate risk Using the appropriate terminology, identify the type of FRA used here Calculate the gain or loss to Godezhy P/L as a consequence of entering the FRA

| | | | |
|---|---|---|---|
| 1 | Long | 1 x 4FRA | R109,429 64 |
| 2. | Long | 3 x 6FRA | R103,194 10 |
| 3 | Short | 1 x 4FRA | R105,353 89 |
| 4 | Short | 3 x 6FRA | R104,382 72 |

9. A portfolio manager expects to purchase a portfolio of stocks in 60 days In order to hedge against a potential price decrease over the next 30 days, she decides to take a short position on a 60-day forward contract on the FTSE 100 stock index The index is currently at 1150 The continuously compounded dividend yield is 8 7% The discrete risk-free rate is 9.2% Calculate the no-arbitrage forward price on this contract, the value of the forward contract 38 days into the contract (index value 1015), and the value of the contract at expiration (index value 1190)

| | | | |
|---|---|---|---|
| 1 | $1,160 23 | -$0 99 | $37 77 |
| 2 | $1,125 00 | $0 53 | $37 44 |
| 3 | $1,150.00 | -$0 41 | $38 50 |
| 4 | $1,150 19 | -$0 12 | $39 81 |

10 The euro currently trades at $1 4463 The dollar risk-free rate is 8%, and the euro risk-free rate is 6% Six-month forward contracts are quoted at a rate of $1 4987 The risk-free profit earned by engaging in a forward contract is *closest* to

1 $0 0277
2 $0 0502
3. $0 0214
4 $0 0232

11 Identify the correct statement from the following alternatives

1 The value of a currency forward contract is the present value of the forward rate at expiration minus the spot rate discounted at the foreign interest rate over the life of the contract
2. Credit risk arises when the counterparty that owes the greater amount is unable to pay at expiration or declares bankruptcy prior to expiration
3 An off-market forward contract is established with a zero value and therefore has no payments at the start of the contract
4 The value of a forward contract at the initiation date equals the spot rate of the underlying asset

12 A security is priced at R100 today The forward contract on this security is currently priced at R107 and expires in 9 months The annual interest rate is 8 30% Calculate the value of the off-market forward contract today

1 –R0 79
2 –R0 21
3 R0 10
4 R0 00

13 Calculate the payoff at expiration for a call and a put option on a futures contract in which the underlying is at 214 76 at expiration, the options are on a futures contract for $100 and the exercise price is 210 32 (call option) and 213 (put option) respectively

1. $1 76 $0
2 $4 44 $0
3 $0 $4 44
4. $0 $1 76

*Use the following formulas to help you in the calculation of questions 14 and 15*

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

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

14 Sylvester Ben, a corporate treasurer needs to hedge the interest rate risk on a future transaction of his company The risk is associated with the rate on 90-day LIBOR in 90 days The term structure of LIBOR is given as follows

90-day LIBOR = 3 5%, 180-day LIBOR = 5.7%

Calculate the FRA expiring in 90-days on the 90-days LIBOR

1 6 65%
2. 6 98%
3. 7 02%
4 7 81%

15 Sylvester Ben took a long position in the FRA, now 50 days later the interest rates are as follows

40-day LIBOR 4 00%
130-day LIBOR 5 00%

The market value of the FRA for a $100 million notional principal is *closest to*

1 - $580,000 00
2 $566,000 00
3. $363,970 00
4 - $363,500 00

*Use the following information to answer question 16 and 17*

Dreamer is long a forward contract on EUR 50 million at 1 63 USD$/EUR, expiring in six months It is also long 100 JPY put options (European style) with expiration in six months, a strike price of 100 JPY/USD$, and a contract size of JPY 12.5 million The current spot exchange rates are 1.64 USD$/EUR and 102 5 JPY/USD$ All of Dreamer's currency derivatives are traded over the counter (OTC) with Nathan Bank. Key interest rates are displayed in Exhibit 1

**Exhibit 1**
**Six-month Risk-free Interest Rates (Annualized)**

| | |
|---|---|
| USD$ | 3 0% |
| EUR | 4 5% |
| JPY | 0 5% |

16 Calculate the amount at risk from a credit loss on the long EUR forward contract Determine which party bears the credit risk

| | Amount at risk | Party that bears credit risk |
|---|---|---|
| 1 | $89,300 00 | Short |
| 2. | $60,000 00 | Long |
| 3 | $38,927 00 | Long |
| 4 | $20,000 00 | Short |

17 Calculate the amount at risk from a credit loss on the long JPY put option contract Determine which party bears the credit risk

| | Amount at risk | Party that bears credit risk |
|---|---|---|
| 1 | $516,449 33 | Short |
| 2 | $405,731.00 | Long |
| 3. | $305,000.00 | Long |
| 4 | $200,063 05 | Short |

18 Four 100,000 euro futures contracts are sold at a price of $1 085 The next day the price settles at $1 029 The mark to market for this account changes the previous day's margin by

1 $22,400
2 -$22,820
3. $24,140
4. -$24,440

19. Indicate the correct statement from the following alternatives

1 Eurodollar futures can be priced as easily as Treasury bill futures
2. A condition in which the futures price is higher than the spot price is known as backwardation
3 The opportunity cost of funds tied up in the investment of the underlying asset does not affect the futures prices
4 A condition in which the futures price is higher than the spot price is known as contango

*Use the following information to answer questions 20 and 21*

Rudo Maravanyika a portfolio manager with Sanlam Asset Management Company considers taking a position in the futures market Given that a R100 face value bond pays a 7% semi-annual coupon, and the annual yield is 5%, the bond has 10 years remaining until maturity, and its price is R115 59 Consider a futures contract that is calling for delivery of this bond only The contract expires in 18 months The risk-free rate is 4 5%

20 What is the appropriate futures price that Rudo should pay at expiration?

1. R110 55
2 R112 74
3. R116 57
4 R120 64

21. Assuming that the futures contract is priced at R118 10, calculate the riskless profit that Rudo would earn if she were to take a *short position* in futures

1 R6 43
2 R6 45
3 R5 26
4. R5 36

22 Consider a stock index option that expires in 148 days The stock index is currently at 67 89 and makes no cash payments during the life of the option Assume that the stock index has a multiplier of 1 The risk-free rate is 4 percent Calculate the lowest and highest possible prices for European-style put options on the above stock index with an exercise price of 69 49

| | Lowest Price | Highest price |
|---|---|---|
| 1 | 52 57 | 0 51 |
| 2 | 42 52 | 0 54 |
| 3 | 0 50 | 68 39 |
| 4 | 47.43 | 0 54 |

23 An analyst at Selah Capital is provided with the following information on put and call options on a stock

Call price = $5.50
Put price = $3 00
Strike price = $44 00
Days to option expiration = 91
Current stock price = $40 00
Risk-free rate = 5%

Use put-call parity to calculate prices of the fiduciary call, and synthetic underlying stock

| | Fiduciary call | Synthetic Stock |
|---|---|---|
| 1 | $5 97 | $45 97 |
| 2. | $48 97 | $45.97 |
| 3 | $5.97 | $41 24 |
| 4 | $48 78 | $41 24 |

24 Consider a two-period binomial model in which a stock currently trades at a price of $10 The stock price can go up 5% or down 5% each period The risk-free rate is 3%. Calculate the price of a European call option expiring in two periods with an exercise price of $9 50

1 $1 98
2 $1 57
3 $1 32
4 $1 06

25 To account for positive cash flows from the underlying asset, we need to adjust the put-call parity formula by

1. subtracting the present value of the cash flows from $S_0$
2 adding the future value of the cash flows to $S_0$
3 adding the future value of the cash flows to X
4 subtracting the present value of the cash flows from X

26 A decrease in the risk-free rate of interest will

1 increase call and put prices
2 decrease call and put prices
3 decrease put prices and increase call prices
4 increase put prices and decrease call prices

27 Consider a one-period binomial model in which the stock currently trades at $100 The stock price can go up 10% or down 10% each period The risk-free rate is 8% A call option on this stock expiring in one period has an exercise price of $105 Calculate the number of units of the underlying stock that would be needed at time 0 in the binomial tree in order to construct a risk-free hedge Use 1,000 calls

1. Long position in 100 shares of the underlying stock
2 Short position in 100 shares of the underlying stock
3 Long position in 250 shares of the underlying stock
4 Short position in 250 shares of the underlying stock

28 A gold futures contract requires the long trader to buy 100 troy ounces of gold The initial margin requirement is R700 and the maintenance margin requirement is R450 When could a long contract holder (June futures price R315) and a short contract holder (August futures price R317) receive a maintenance margin call, respectively?

| | Long contract holder | Short contract holder |
|---|---|---|
| 1 | Price falls below R312 50 | Price falls below R314 50 |
| 2. | Price falls below R312 50 | Price rises above R319 50 |
| 3 | Price rises above R317 50 | Price rises above R319 50 |
| 4. | Price rises above R317 50 | Price falls below R314 50 |

*Use the following formulas to assist you in your calculations in question 29.*

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

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

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

29. Consider an asset that trades at \$35 today Call and put options on this asset are available with an exercise price of \$38. The options expire in 187 days, and the volatility is 0 29. The continuously compounded risk-free rate is 7%. Calculate the values of European call and put options using the Black-Scholes-Merton model, assuming that the present value of cash flows on the underlying asset over the life of the option is zero

| | | |
|---|---|---|
| 1 | \$0 | \$4 55 |
| 2 | \$3 90 | \$3 24 |
| 3 | \$2 24 | \$3 90 |
| 4 | \$4 55 | \$0 |

Question 30-31: A forward contract is priced at 30 European options on the forward contract have and exercise price of 35 and expires in 125 days *The discrete risk-free rate is 6%*, and volatility is 0.44

*Use the following formulas to assist you in your calculations*

$$p = e^{-r^c T}\left[XN(-d_2) - FN(-d_1)\right]$$

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

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

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

30. Calculate $d_1$ and $d_2$, using the Black model.

| | | |
|---|---|---|
| 1 | -0 4699 | -0 7274 |
| 2 | 0 4160 | 0 7009 |
| 3 | 0 4251 | 0 7907 |
| 4. | -0 4345 | -0.7967 |

31 Calculate the price of the put option on the forward contract using the Black model

1 \$0 00
2 \$0 79
3 \$0 10
4. \$1 88

32 A company has most of its liabilities in the form of floating-rate notes with a maturity of two years and quarterly reset The company is not concerned with interest rate movements over the next four quarters but is interested in the potential movement thereafter Identify the most appropriate strategy that would allow the company to hedge the expected change in interest rates

1 Go long a payer swaption with a one-year maturity
2 Go long a receiver swaption with a one-year maturity
3 Enter into a two-year, quarterly pay-floating, receive-fixed swap
4 Enter into a one-year quarterly pay fixed, receive-floating swap

*Use the following data to answer Questions 33 and 34*

Consider a 3-year annual currency swap that takes place between a firm in South Africa (NeNyasha Holdings) and an American firm (Trump Towers) Trump Towers is a fixed rate payer and NeNyasha Holdings is the floating rate payer The fixed interest rate at the initiation of the swap is 4%, and 6% at the end of the swap The variable rate is 3% currently, 4% at the end of the year 1, 6% at the end of year 2, and 4% at the end of year 3 At the beginning of the swap, $5 million dollars is exchanged at an exchange rate of R7.77/$ At the end of the swap period the exchange rate is R7 33/$

Note with currency swaps, end of period payments are based on beginning of period interest rates

33 At the initiation of the swap which statement is most likely correct?

1 NeNyasha Holdings receives R27 99 million from Trump towers
2 Trump towers receives R38 85 million from NeNyasha Holdings
3 NeNyasha Holdings pays Trump towers $5 million
4 Trump towers pays NeNyasha Holdings R5 million

34 At the end of year 2

1 NeNyasha Holdings pays R1,500,000, Trump towers pays $250,000
2 NeNyasha Holdings pays $200,000, Trump towers pays R1,554,000
3 NeNyasha Holdings pays R200,000, Trump towers pays $19,000
4 NeNyasha Holdings pays $250,000, Trump towers pays R1,500,000

*Use the following data to answer Question 35*

Consider a European receiver swaption that expires in one year and is on a two-year swap that will make semiannual payments The swaption has an exercise rate of 6% and the notional principal in $50 million At expiration the term structure of interest rates is as follows:

$L_0(180) = 0\ 06$
$L_0(360) = 0\ 07$
$L_0(540) = 0\ 06$
$L_0(720) = 0\ 05$

35 Calculate the market value of the swaption at expiration:

1 $1,500,000 00
2 $1,714,000 00
3. $1,501,250 00
4. $1,045,000 00

*Use the following information to answer questions 36 and 37*

Ruvarashe makes the following statements regarding the credit risk on currency swaps.

Statement 1 "The credit risk on currency swaps is greatest at the middle of the swap term "
Statement 2 "The credit risk on currency swaps is bilateral and isolated to one party "

In order to hedge against increase in interest rates on borrowed funds Ruvarashe entered into a $1,000,000 quarterly-pay plain vanilla interest rate swap as the fixed-rate payer at a fixed rate of 3% based on a 360-day year. The Bank (floating-rate payer) agrees to pay 90-day LIBOR plus a 1% margin, 90-day LIBOR is currently 2 1%

| | | |
|---|---|---|
| 90-day LIBOR rates are | 2 5% | 90-days from now |
| | 2 0% | 180-days from now |
| | 1 9% | 270-days from now |
| | 2 8% | 360-days from now |

36 Regarding Ruvarashe's statements are these statements correct or incorrect?

| | Statement 1 | Statement 2 |
|---|---|---|
| 1 | Correct | Incorrect |
| 2 | Incorrect | Correct |
| 3 | Correct | Correct |
| 4 | Incorrect | Incorrect |

37 Calculate the amounts that Ruvarashe pays or receives 90, 270, and 360 days from now

| | 90 Days | 270 days | 360 days |
|---|---|---|---|
| 1 | - $118 00 | $200 00 | $150 00 |
| 2 | $200 00 | $150 00 | $255 00 |
| 3. | - $250 00 | $0 00 | $250 00 |
| 4 | $200 00 | $300 00 | $300 00 |

*Use the following data to answer Questions 38 and 39*

Consider a two-year interest rate swap with semi-annual payments. Assume a notional principal of $50 million

*Use the following formulas to assist you in your calculations*

$$Z_t = \frac{1}{1+\left(R_t \times \frac{days}{360}\right)}$$

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

38 Calculate the semi-annual fixed payment and the annualized fixed rate on the swap if the current term structure of LIBOR interest rates is as follows

$L_0(180) = 0\ 0688$, $L_0(360) = 0\ 0700$

$L_0(540) = 0\ 0715$, $L_0(720) = 0\ 0723$

| | Semi-annual fixed payment | Annualized fixed rate |
|---|---|---|
| 1 | $1,715,000 | 6 86% |
| 2 | $2,205,000 | 8 22% |
| 3 | $2,225,000 | 4 90% |
| 4 | $3,614,900 | 3 43% |

39 Calculate the market value of the swap 120 days later from the point of view of the party paying the floating rate and receiving the fixed rate, and from the point of view of the party paying the fixed rate and receiving the floating rate if the term structure 120 days later is as follows

$L_{120}(60)$ = 0 0620, $L_{120}(240)$ = 0.0631
$L_{120}(420)$ = 0 0649, $L_{120}(600)$ = 0 0687

| | Paying floating | Paying fixed |
|---|---|---|
| 1. | -$715,000.00 | $715,000 00 |
| 2 | $205,000 00 | -$205,000 00 |
| 3 | -$300,000 00 | $300,000 00 |
| 4 | $150,000.00 | -$150,000 00 |

40 Assume an asset manager enters into a one-year equity swap in which he will receive the return on the Nasdaq 100 Index in return for paying a floating interest rate The swap calls for quarterly payments The Nasdaq 100 is at 2,000 at the beginning of the swap Ninety days later, the rate $L_{90}(90)$ is 0 0470. Calculate the market value of the swap 130 days from the beginning of the swap if the Nasdaq 100 is at 1,877.12, the notional principal of the swap is $30 million, and the term structure is

$L_{130}(50)$ = 0 0500
$L_{130}(140)$ = 0 0490
$L_{130}(230)$ = 0 0400

1 $3,300,000 00
2. $2,240,000 00
3. $1,986,000 00
4 $1,614,900 00

**Total marks** **[40]**

*Cumulative Probabilities for a Standard Normal Distribution*

**$P(X \leq x) = N(x)$ for $x \geq 0$ 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 |

**PAGE FOR ROUGH WORK**

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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

1

PAPER NUMBER
VRAESTELNOMMER

2

INITIALS AND SURNAME
VOORLETTERS EN VAN

3

DATE OF EXAMINATION
DATUM VAN EKSAMEN

4

EXAMINATION CENTRE (E G PRETORIA)
EKSAMENSENTRUM (BV PRETORIA)

5

STUDENT NUMBER
STUDENTENOMMER

6

7

UNIQUE PAPER NO
UNIEKE VRAESTEL NR

8

9

For use by examination invigilator

Vir gebruik deur eksamenopsiener

### IMPORTANT

1 USE ONLY AN HB PENCIL TO COMPLETE THIS SHEET
2 MARK LIKE THIS ●
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 ●
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

10

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | c1 c2 c3 c4 c5 | 36 | c1 c2 c3 c4 c5 | 71 | c1 c2 c3 c4 c5 | 106 | c1 c2 c3 c4 c5 |
| 2 | c1 c2 c3 c4 c5 | 37 | c1 c2 c3 c4 c5 | 72 | c1 c2 c3 c4 c5 | 107 | c1 c2 c3 c4 c5 |
| 3 | c1 c2 c3 c4 c5 | 38 | c1 c2 c3 c4 c5 | 73 | c1 c2 c3 c4 c5 | 108 | c1 c2 c3 c4 c5 |
| 4 | c1 c2 c3 c4 c5 | 39 | c1 c2 c3 c4 c5 | 74 | c1 c2 c3 c4 c5 | 109 | c1 c2 c3 c4 c5 |
| 5 | c1 c2 c3 c4 c5 | 40 | c1 c2 c3 c4 c5 | 75 | c1 c2 c3 c4 c5 | 110 | c1 c2 c3 c4 c5 |
| 6 | c1 c2 c3 c4 c5 | 41 | c1 c2 c3 c4 c5 | 76 | c1 c2 c3 c4 c5 | 111 | c1 c2 c3 c4 c5 |
| 7 | c1 c2 c3 c4 c5 | 42 | c1 c2 c3 c4 c5 | 77 | c1 c2 c3 c4 c5 | 112 | c1 c2 c3 c4 c5 |
| 8 | c1 c2 c3 c4 c5 | 43 | c1 c2 c3 c4 c5 | 78 | c1 c2 c3 c4 c5 | 113 | c1 c2 c3 c4 c5 |
| 9 | c1 c2 c3 c4 c5 | 44 | c1 c2 c3 c4 c5 | 79 | c1 c2 c3 c4 c5 | 114 | c1 c2 c3 c4 c5 |
| 10 | c1 c2 c3 c4 c5 | 45 | c1 c2 c3 c4 c5 | 80 | c1 c2 c3 c4 c5 | 115 | c1 c2 c3 c4 c5 |
| 11 | c1 c2 c3 c4 c5 | 46 | c1 c2 c3 c4 c5 | 81 | c1 c2 c3 c4 c5 | 116 | c1 c2 c3 c4 c5 |
| 12 | c1 c2 c3 c4 c5 | 47 | c1 c2 c3 c4 c5 | 82 | c1 c2 c3 c4 c5 | 117 | c1 c2 c3 c4 c5 |
| 13 | c1 c2 c3 c4 c5 | 48 | c1 c2 c3 c4 c5 | 83 | c1 c2 c3 c4 c5 | 118 | c1 c2 c3 c4 c5 |
| 14 | c1 c2 c3 c4 c5 | 49 | c1 c2 c3 c4 c5 | 84 | c1 c2 c3 c4 c5 | 119 | c1 c2 c3 c4 c5 |
| 15 | c1 c2 c3 c4 c5 | 50 | c1 c2 c3 c4 c5 | 85 | c1 c2 c3 c4 c5 | 120 | c1 c2 c3 c4 c5 |
| 16 | c1 c2 c3 c4 c5 | 51 | c1 c2 c3 c4 c5 | 86 | c1 c2 c3 c4 c5 | 121 | c1 c2 c3 c4 c5 |
| 17 | c1 c2 c3 c4 c5 | 52 | c1 c2 c3 c4 c5 | 87 | c1 c2 c3 c4 c5 | 122 | c1 c2 c3 c4 c5 |
| 18 | c1 c2 c3 c4 c5 | 53 | c1 c2 c3 c4 c5 | 88 | c1 c2 c3 c4 c5 | 123 | c1 c2 c3 c4 c5 |
| 19 | c1 c2 c3 c4 c5 | 54 | c1 c2 c3 c4 c5 | 89 | c1 c2 c3 c4 c5 | 124 | c1 c2 c3 c4 c5 |
| 20 | c1 c2 c3 c4 c5 | 55 | c1 c2 c3 c4 c5 | 90 | c1 c2 c3 c4 c5 | 125 | c1 c2 c3 c4 c5 |
| 21 | c1 c2 c3 c4 c5 | 56 | c1 c2 c3 c4 c5 | 91 | c1 c2 c3 c4 c5 | 126 | c1 c2 c3 c4 c5 |
| 22 | c1 c2 c3 c4 c5 | 57 | c1 c2 c3 c4 c5 | 92 | c1 c2 c3 c4 c5 | 127 | c1 c2 c3 c4 c5 |
| 23 | c1 c2 c3 c4 c5 | 58 | c1 c2 c3 c4 c5 | 93 | c1 c2 c3 c4 c5 | 128 | c1 c2 c3 c4 c5 |
| 24 | c1 c2 c3 c4 c5 | 59 | c1 c2 c3 c4 c5 | 94 | c1 c2 c3 c4 c5 | 129 | c1 c2 c3 c4 c5 |
| 25 | c1 c2 c3 c4 c5 | 60 | c1 c2 c3 c4 c5 | 95 | c1 c2 c3 c4 c5 | 130 | c1 c2 c3 c4 c5 |
| 26 | c1 c2 c3 c4 c5 | 61 | c1 c2 c3 c4 c5 | 96 | c1 c2 c3 c4 c5 | 131 | c1 c2 c3 c4 c5 |
| 27 | c1 c2 c3 c4 c5 | 62 | c1 c2 c3 c4 c5 | 97 | c1 c2 c3 c4 c5 | 132 | c1 c2 c3 c4 c5 |
| 28 | c1 c2 c3 c4 c5 | 63 | c1 c2 c3 c4 c5 | 98 | c1 c2 c3 c4 c5 | 133 | c1 c2 c3 c4 c5 |
| 29 | c1 c2 c3 c4 c5 | 64 | c1 c2 c3 c4 c5 | 99 | c1 c2 c3 c4 c5 | 134 | c1 c2 c3 c4 c5 |
| 30 | c1 c2 c3 c4 c5 | 65 | c1 c2 c3 c4 c5 | 100 | c1 c2 c3 c4 c5 | 135 | c1 c2 c3 c4 c5 |
| 31 | c1 c2 c3 c4 c5 | 66 | c1 c2 c3 c4 c5 | 101 | c1 c2 c3 c4 c5 | 136 | c1 c2 c3 c4 c5 |
| 32 | c1 c2 c3 c4 c5 | 67 | c1 c2 c3 c4 c5 | 102 | c1 c2 c3 c4 c5 | 137 | c1 c2 c3 c4 c5 |
| 33 | c1 c2 c3 c4 c5 | 68 | c1 c2 c3 c4 c5 | 103 | c1 c2 c3 c4 c5 | 138 | c1 c2 c3 c4 c5 |
| 34 | c1 c2 c3 c4 c5 | 69 | c1 c2 c3 c4 c5 | 104 | c1 c2 c3 c4 c5 | 139 | c1 c2 c3 c4 c5 |
| 35 | c1 c2 c3 c4 c5 | 70 | c1 c2 c3 c4 c5 | 105 | c1 c2 c3 c4 c5 | 140 | c1 c2 c3 c4 c5 |