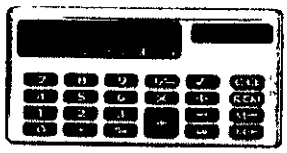
UNIVERSITY EXAMINATIONS



UNIVERSITEITSEKSAMENS

UNISA university of south africa

INV3703 (472915) October/November 2011

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 26 pages, including the Standard Normal Distribution table (p. 20) and six sheets of paper for rough work (pp 21-26) and the instructions for completing a mark-reading sheet. All 40 questions must be answered on the mark-reading sheet.
Hierdie vraestel bestaan uit 26 bladsye Dit bevat die standaard normaal verdeling tabelle (p 20), ses velle rofwerk papier (pp 21-26) asook die instruksies vir die voltooiing van die merkleesblad Beantwoord al 40 vrae op die merkleesblad

Indicate your student number and the correct unique number on the mark-reading sheet.
Dui u studentenommer en die korrekte unieke nommer aan op die merkleesblad

Unique number: 472915
Unieke nommer 472915

NB: PLEASE COMPLETE THE ATTENDANCE REGISTER ON THE BACK PAGE, TEAR IT OFF AND HAND IT TO THE INVIGILATOR.
LW VOLTOOI ASSEBLIEF DIE BYWONINGSREGISTER OP DIE AGTERBLAD, SKEUR DIT AF EN OORHANDIG DIT AAN DIE TOESIGHOUER

1. Identify the correct statement from the following alternatives:
Identifiseer die korrekte stelling van die volgende alternatiewe

1. **Forward contracts are traded on a forward exchange.**
   Vooruitkontrakte verhandel op 'n vooruitvalutabeurs
2. **Futures contracts can be traded on the exchange and over-the-counter.**
   Termynkontrakte kan verhandel op die beurs en die mark
3. **Call options grant the holder the opportunity to buy the underlying security at a price above the current market price.**
   Koopopsies verleen aan die houer die reg om die onderliggende effek te koop teen 'n prys bo die huidige mark prys
4. **Contingent claims are contracts in which the payoff will occur if a specific event takes place.**
   Voorwaardelike eise is kontrakte waar afbetaling sal plaasvind indien 'n spesifieke gebeurtenis geskied

2. Which of the following accurately describes an option?
Watter een van die volgende stellings beskryf 'n opsie die beste?

1. **An option is a right but not an obligation to buy or sell an asset at a specific price.**
   'n Opsie is 'n reg maar nie 'n verpligting om 'n bate te koop of verkoop teen 'n spesifieke prys
2. **An option is the exchange of one asset for another.**
   'n Opsie is die ruil van 'n bate vir 'n ander bate.
3. **An option is a series of forward contracts.**
   'n Opsie is 'n reeks van termynkontrakte
4. **An option is highly regulated.**
   'n Opsie is hoogs gereguleerd

3. **The following information is available for a security:**
Die volgende inligting is bekend vir 'n effek

Current price = R63
Risk-free rate = 7.5%
Huidige prys = R63
Risiko-vryekoers = 7 5%

A dealer offers you a forward contract for delivery in three months on the security at a price of R66. How would you earn an arbitrage profit?
'n Handelaar bied 'n vooruitkontrak aan jou vir lewering oor 3 maande, die effek verhandel huidiglik teen R66 Hoe sal jy deur gebruik te maak van die arbitrage geleentheid wins genereer?

1. **Buy the forward contract, borrow money and buy the security.**
Koop die vooruitkontrak , leen geld en koop die effek
2. **Sell the forward contract, borrow money and buy the security.**
Verkoop die vooruitkontrak, leen geld en koop die effek
3. **Buy the forward contract, sell the security and invest the proceeds.**
Koop die vooruitkontrak, verkoop die effek en belê die opbrengste
4. **Sell the forward contract, sell the security and invest the proceeds**
Verkoop die vooruitkontrak, verkoop die effek en belê die opbrengste

4. **What will happen to a party who is *short in a* bond forward position if market interest rates decreases?**
Wat sal gebeur as mark rentekoerse daal, met 'n party wat 'n verkoop vooruit posisie geneem het?

1. **A short, will have losses.**
'n Kort posisie sal lei tot verliese
2. **A short, will have profits.**
'n Kort posisie sal lei tot winste
3. **A short, will have a right not to perform.**
'n Kort posisie sal die reg verleen om nie te hoef presteer nie
4. **A short will have his/her position unchanged.**
'n Kort posisie sal gevolglik veroorsaak dat die posisie onveranderd bly

5. **Telone P/L is expecting to receive a cash inflow of R15,000,000.00 in 90 days. Short-term interest rates are expected to decrease during the next 90 days. In order to hedge against this risk, the company decides to use a FRA that expires in 90 days and is based on 90 day LIBOR. The FRA is quoted at 6.5%. At expiration LIBOR is 5%. Indicate whether the company should take a long or short position to hedge interest rate risk. Calculate the gain or loss to Telone P/L as a consequence of entering the FRA.**
Telone P/L verwag 'n kontantinvloei van R15,000,000 00 binne 90 dae Daar word verwag dat korttermyn rentekoerse sal daal binne die volgende 90 dae Om teen hierdie risiko te verskans het die maatskappy belsuit om 'n vooruitkoersooreenkoms (VKO) te sluit, die VKO verstryk binne 90 dae en is op die 90-dae LIBOR koers gebaseer Die VKO is gekwoteer teen 6 5% en die LIBOR koers is op die verstrykingsdatum 5% Dui aan of die maatskappy 'n lang of 'n kort posisie moet neem om die rentekoers risiko te verskans Bereken die wins of verlies vir Telone P/L as gevolg van die VKO

1. **Short** **R61,821.77**
   Kort *R61,821 77*
2. **Long** **R59,754.72**
   Lank *R59,754 72*
3. **Long** **-R58,321.66**
   Lank *-R58,321 66*
4. **Short** **R55,555.56**
   Kort *R55,555 56*

6. **The US$ currently trades at R6.7117/$. The Rand risk-free rate is 7% and the US$ risk-free rate is 5.4%. Six-month forward contracts are quoted at a rate of R6.9866/$. The arbitrage profit earned by engaging in a forward contract is *closest* to:**
Die VSA $ verhandel tans teen R6 7117/$ Die Rand risikovryekoers is 7% terwyl die risikovryekoers vir die VSA $ 5 4% is 6-Maande vooruitkontrakte is gekwoteer teen 'n koers van R6 9866/$ Die arbitrage wins verdien deur 'n vooruitkontrak aan te gaan is die naaste aan

1. **R0.0026**
2. **R0.0118**
3. **R0.0343**
4. **R0.0480**

7. **Identify the correct statement from the following alternatives:**
Identifiseer die korrekte stelling van die volgende alternatiewe

   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.**
   Die waarde van 'n valuta vooruitkontrak is gelyk aan die huidige waarde van die vooruitkoers op verstryking minus die sigkoers verdiskonteer teen die buitelandse rentekoers oor die verloop van die kontrak
   2. **Credit risk arises when the counterparty that owes the greater amount is unable to pay at expiration or declares bankruptcy prior to expiration.**
   Kredietrisiko ontstaan wanneer die teen party wat die groter bedrag skuld nie instaat is om sy verpligting na te kom voor of op die datum van verstryking nie
   3. **An off-market forward contract is established with a zero value and therefore has no payments at the start of the contract.**
   'n Buitemark vooruitkontrak is gestig met 'n nul waarde en het dus geen betalings aan die begin van die kontrak nie
   4. **The value of a forward contract at the initiation date equals the spot rate of the underlying asset.**
   Die waarde van 'n vooruitkontrak by die aanvangsdatum is gelyk aan die sigkoers van die onderliggende bate

8. **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:**
'n Effek verhandel huidiglik teen R100 Die vooruitkontrak op hierdie effek is tans gewaardeer teen R107 en verstryk binne 9 maande Die jaarlikse rentekoers is 8 30% Bereken die huidige waarde van die buitemark vooruitkontrak

   1. **–R0.79**
   2. **–R0.21**
   3. **R0.10**
   4. **R0.00**

Use the following formulas to help you in the calculation of questions 9 & 10
Bereken vraag 9 en 10 se antwoorde m b v die volgende formules

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

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

9. **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:**
Sylvester Ben, 'n korporatiewe tesourier moet die rentekoers risiko op 'n toekomstige transaksie van sy maatskappy verskans Die risiko hou verband met die 90-dag Libor koers binne 90 dae Die huidige koerse vir Libor is soos volg

90-day Libor	**3.5%**
180-day Libor	**5.7%**
90-dag Libor	*3 5%*
180-dag Libor	*5 7%*

Calculate the FRA expiring in 90-days on the 90-days Libor.
Bereken die VKO wat verstryk oor 90-dae op die 90-dae Libor koers

1. **6.65%**
2. **6.98%**
3. **7.02%**
4. **7.81%**

10. **Sylvester Ben took a long position in the FRA, now 50 days later the interest rates are as follows:**
Sylvester Ben het 'n lang posisie geneem in die VKO, 50 dae later het die rentekoerse verander soos volg

40-day Libor	**4.00%**
130-day Libor	**5.00%**
40-dag Libor	*4 00%*
130-dag Libor	*5 00%*

The market value of the FRA for a $100 million notional principal is *closest to:*
Die markwaarde van die VKO vir $100 miljoen hoofskuld is die naaste aan

1. **- $390,000.00**
2. **$366,000.00**
3. **$363,970.00**
4. **- $263,500.00**

11. **Tawana Mhofu has entered a six months currency forward contract to purchase £10 million at an exchange rate of R10.31/£. After six months at settlement, the exchange rate is R10.77/£. If the contract is settled in cash, Tawana will:**
Tawana Mhofu het 'n 6 maande valuta vooruitkontrak bekom om £ 10 miljoen te koop teen 'n wisselkoers van R10 31/£ 6 Maande na vereffening is die wisselkoers R10 77/£ Indien die kontrak in kontant vereffen word sal Tawana

1. **Receive a payment of R4,600,000**
   'n Betaling van R 4,600,000 ontvang
2. **Make a payment of R4,600,000**
   'n Betaling van R 4,600,000 maak
3. **Receive a payment of R2,300,000**
   'n Betaling van R 2,300,000 ontvang
4. **Make a payment of R2,300,000**
   'n Betaling van R 2,300,000 maak

Use the following information to answer questions 12 and 13.
Gebruik die volgende inligting om vraag 12 en 13 te beantwoord

Mr. K. Chipendo is a trader for a large commodity company. He has been asked to look into the possibility of investing in gold futures. Mr. Chipendo has gathered the following information: The current price of gold is $300 and the risk-free interest rate is 7.5%. Assume the net cost of carry for gold is zero.
Mnr K Chipendo is 'n handelaar vir 'n groot kommoditeitsmaatskappy Hy is gevra om te kyk na die moontlikheid van 'n belegging in goud in die toekoms Mnr Chipendo versamel die volgende inligting Die huidige prys van goud is $300 en die risiko-vrye koers is 7 5% Aanvaar dat die netto drawaarde van die goud nul is

12. **Calculate the price of the gold futures contract that expires in 270 days.**
Bereken die prys van die goud termynkontrakte wat verstryk in 270 dae

1. **$300.04**
2. **$303.64**
3. **$314.59**
4. **$316.49**

13. If the futures contract were priced at $310, what arbitrage transaction could be executed?
Indien die termynkontrak verhandel teen $310, watter arbitrage transaksie kan uitgevoer word?

1. **Take a long futures position and sell short the gold.**
   Neem 'n lang termynkontrak posisie en verkoop die goud op 'n prysdaling
2. **Take a long futures position and buy the gold.**
   Neem 'n lang termynkontrak posisie en koop die goud
3. **Take a short futures position and buy the gold.**
   Neem 'n kort termynkontrak posisie en koop die goud
4. **Take a short futures position and sell short the gold.**
   Neem 'n kort termynkontrak posisie en verkoop die goud op 'n prysdaling

14. 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:
Vier € 100,000 termynkontrakte verhandel teen $1 085 Die volgende dag het die prys gedaal tot $1 029 Die effek op die merk-tot-mark margerekening teenoor die vorige dag is

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

15. Indicate the correct statement from the following alternatives:
Identifiseer die korrekte stelling van die volgende alternatiewe

1. **Eurodollar futures can be priced as easily as Treasury bill futures.**
   Eurodollar termynkontrakte is net so eenvoudig om te waardeer soos skatkiswissel termynkontrakte
2. **A condition in which the futures price is higher than the spot price is known as backwardation.**
   Effektehuur is die toestand wat ontstaan indien die termynkontrak prys hoer is as die lokoprys
3. **The opportunity cost of funds tied up in the investment of the underlying asset does not affect the futures prices.**
   Die geleentheidskoste van 'n belegging het nie 'n effek op die termynprys van die bate nie
4. **A condition in which the futures price is higher than the spot price is known as contango.**
   Prolongasie is 'n toestand wat ontstaan as die termynkontrak prys hoer is as die lokoprys

Use the following information to answer questions 16 and 17.
Gebruik die volgende inligting om vraag 16 en 17 te beantwoord

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%.
Rudo Maravanyika is 'n portefeuljebestuurder by Sanlam Batebestuurders en beoog om 'n posisie te neem in die termynkontrakmark Veronderstel dat daar 'n R100 gesigwaarde effek met 'n 7% half-jaarlikse koepon en 'n jaarlikse opbrengs van 5% bestaan met 'n 10 jaar termyn voor verstryking en verhandel huidiglik teen R115 59 'n Termynkontrak vir lewering van die effek verstryk in 18 maande Die risiko vryekoers is 4 5%

$$F_0T = B_0^c(T+Y)[1+r_0(T)]^T - FV(C1,0,T)$$
$$V_0(T) = ST - F_0(T)$$

16. What is the appropriate futures price that Rudo should pay at expiration?
Hoeveel sal Rudo teen die verstrykingsdatum betaal vir die termynkontrak?

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

17. 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.
Veronderstel die termynkontrak verhandel teen R118 10, bereken die risiko vrye wins wat Rudo sou verdien indien sy 'n kort termynkontrak posisie sou neem

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

18. The existence of a delivery option with respect to treasury bond futures means that the:
'n Opsie met lewering mbt 'n skatkiswissel-termynkontrak beteken dat die

1. **short can choose which bond to deliver.**
   Kort-opsie bepaal watter effek uitlewer
2. **the short has the option to settle in cash or by delivery.**
   Kort-opsie het die reg om te skik in kontant of lewering
3. **the long chooses which of a number of bonds will be delivered.**
   Lang-opsie bepaal die aantal effekte wat gelewer sal word
4. **the long has the option to be settled in cash or receive bonds.**
   Lang-opsie het die reg om vereffen te word in kontant of om effekte te ontvang

19. **Consider a European style call option on a bond. The option expires in 180 days. The bond is currently priced at $78.00 and makes no cash payments during the life of the option. The risk-free rate is 7%. Calculate the lowest and highest possible price for the call option with exercise price of $80.00.**
Oorweeg 'n Europeses koopopsie op 'n effek Die opsie verstryk binne 180 dae Die effek verhandel teen $78 00 en maak geen kontantbetalings tydens die lewe van die opsie nie Die risikovrye koers is 7% Bereken die laagste en die hoogste moontlike prys vir die koopopsie met 'n uitoefen prys van $ 80 00

	Lowest Price *Laagste prys*	Highest price *Hoogste prys*
1.	**$6.22**	**$0.00**
2.	**$0.00**	**$55.00**
3.	**$0.63**	**$78.00**
4.	**$0 22**	**$80.22**

20. **An analyst at Selah Capital is provided with the following information on put and call options on a stock.**
'n Ontleder by Sela Kapitaal word voorsien met die volgende inligting oor koop- en verkoopopsies van 'n effek

Call price =	**$5.50**	= *Koopopsieprys*
Put price =	**$3.00**	= *Verkoopopsieprys*
Strike price =	**$44.00**	= *Trefprys*
Days to option expiration = 91		= *Dae tot verstryking*
Current stock price = $40.00		= *Huidige prys van effek*
Risk-free rate =	**5%**	= *Risikovrye koers*

Use put-call parity to calculate prices of the synthetic put option, and synthetic underlying stock.
Gebruik die koop- verkoopopsie pariteit om die prys te bepaal van die sintetiese verkoopopsie en aandeel

	Synthetic put *Sintetiese verkoopopsie*	Synthetic Stock *Sintetiese aandeel*
1.	**$8.97**	**$45.97**
2.	**$8.54**	**$49.96**
3.	**$8.71**	**$41.24**
4.	**$8.78**	**$41.96**

21. **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.**
Oorweeg 'n twee termyn binomiaalmodel van 'n aandeel wat tans verhandel teen $10 Die aandeelprys kan styg of daal met 5% elke termyn Die risikovryekoers is 3% Bereken die prys van 'n Europese koopopsie wat verstryk oor twee periodes teen 'n uitoefeningsprys van $ 9 50

1. **$1.98**
2. **$1.57**
3. **$1.32**
4. **$1.06**

22. **Moreblessing Mazvanya is an owner of a call option on oil futures with a strike price of R77. *Moreblessing Mazvanya:***
Moreblessings Mazvanya is die eienaar van 'n koopopsie op olie-termynkontrakte met 'n trefprys van R 77 Moreblessings Mazvanya

1. **can exercise the option and take delivery of the oil.**
kan die opsie uitoefen en lewering van die olie neem
2. **can exercise the option and take a long position in oil futures.**
kan die opsie uitoefen en daarna 'n lang posisie in olie-termynkontrakte neem
3. **would not exercise the option when the spot price of oil is less than the strike.**
sou nie die opsie uitoefen wanneer die lokoprys laer is as die trefprys nie
4. **would not exercise the option when inflation increases.**
sou nie die opsie uitoefen as inflasie toeneem nie

23. **To account for positive cash flows from the underlying asset, we need to adjust the put-call parity formula by:**
Om rekening te hou van positiewe kantantvloei van die onderliggende bate, moet ons die koop- verkoopopsie pariteit formule aan pas deur

1. **subtracting the present value of the cash flows from S_0.**
die huidige waarde van die kontantvloei aftrek van S_0
2. **adding the future value of the cash flows to S_0.**
die toekomstige waarde van die kontantvloei by S_0 byvoeg
3. **adding the future value of the cash flows to X.**
X en die toekomstige waarde van die kontantvloei bymekaar tel
4. **subtracting the present value of the cash flows from X.**
die huidige waarde van die kontantvloei van X aftrek

24. A decrease in the risk-free rate of interest will:
'n Afname in die risikovrye rentekoers sal

1. **increase call and put prices.**
   Koop- en verkoopopsie pryse verhoog
2. **decrease call and put prices.**
   Koop en verkoopopsie pryse verlaag
3. **decrease put prices and increase call prices.**
   Verkoopopsie pryse laat daal en die koopopsie pryse laat toeneem
4. **increase put prices and decrease call prices.**
   Verkoopopsie pryse laat toeneem en die koopopsie pryse laat daal

25. 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.
Oorweeg 'n enkeltydperk binomiaalmodel van 'n aandeel wat tans verhandel teen $100 Die aandeelprys kan toeneem of afneem met 10% elke periode Die risikovryekoers is 8% 'n Koopopsie op hierdie aandeel wat verstryk in die tydperk verhandel teen $ 105 Bereken die hoeveelheid van die onderliggende aandeel wat teen die aanvangstyd in die binomiaal boom benodig word om verskansing toe te pas Gebruik 1,000 koopopsies

1. **Long position in 100 shares of the underlying stock.**
   'n Koop posisie van 100 aandele in die onderliggende bate
2. **Short position in 100 shares of the underlying stock.**
   'n Verkoop posisie van 100 aandele van die onderliggende bate
3. **Long position in 250 shares of the underlying stock.**
   'n Koop posisie van 250 aandele van die onderliggende bate
4. **Short position in 250 shares of the underlying stock.**
   'n Verkoop posisie van 250 aandele in die onderliggende bate

26. Consider the following information on put and call options on a stock and calculate the arbitrage profit one would make using a synthetic call:
Die volgende inligting bestaan oor koop- en verkoopopsies van 'n aandeel Bereken die wins wat deur arbitrage gegenereer sou word indien 'n sintetiese koopopsie gebruik sou word

Call price, c_0	**$22**	*Koopopsie, c_0*
Put price, p_0	**$12.80**	*Verkoopopsie, p_0*
Exercise price, X	**$155**	*Uitoefenprys, X*
Days to expiration	**280**	*Dae tot verstryking*
Current stock price, S_0	**$156**	*Huidige aandeelprys, S_0*
Risk-free rate, r	**8%**	*Risikovrye koers*

1. $0.13
2. $0.69
3. $1.41
4. $2.29

Question 27-28: Consider an asset that trades at $20 today. Call and put options on this asset are available at an exercise price of $21. The options expire in 180 days, and the volatility is 0.77. The *continuously compounded risk-free rate* is 7%.
Vraag 27 en 28 Neem 'n bate wat huidiglik verhandel teen $ 20 Koop- en verkoopopsies op hierdie bate is beskikbaar en het 'n uitoefeningprys van $ 21 Die opsies verstryk in 180 dae en die ongestadigheid is 0 77 Die saamgestelde risikovrye rentekoers is 7%

Use the following formulas to assist you in your calculations
Gebruik die formules om u berekeninge te vergemaklik

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

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

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

27. Calculate the $N(d_1)$ and $N(d_2)$ using the Black-Scholes-Merton model.
Bereken die $N(d_1)$ asook die $N(d_2)$ mbv die Black-Scholes Merton model

	$N(d_1)$	$N(d_2)$
1.	**0.5571**	**0.2325**
2.	**0.5948**	**0.3821**
3.	**0.5714**	**0.3859**
4.	**0.5887**	**0.5557**

28. Calculate the values of a European call option using the Black-Scholes-Merton model.
Bereken die waardes van 'n Europese koopopsie mbv die Black-Scholes Merton model

1. **$3.77**
2. **$4.00**
3. **$4.14**
4. **$5.16**

Question 29-30: 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.
Vraag 29 en 30 'n Vooruitkontrak verhandel teen $ 30 Europese opsies op die vooruitkontrak het 'n uitoefeningsprys van $ 35 en verstryk binne 125 dae Die diskrete risikovrye koers is 6% en ongestadigheid is 0 44

Use the following formulas to assist you in your calculations
Maak gebruik van die volgende formules vir u berekeninge indien nodig

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

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

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

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

29. Calculate d_1 and d_2, using the Black model.
Bereken d_1 en d_2 mbv die Black model

1. **-0.4699 -0.7274**
2. **0.4160 0.7009**
3. **0.4251 0.7907**
4. **-0.4345 -0.7967**

30. Calculate the price of the put option on the forward contract using the Black model.
Bereken die prys van 'n verkoopopsie op 'n vooruitkontrak mbv die Black model

1. **$0.00**
2. **$0.79**
3. **$0.10**
4. **$1.88**

31. 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.
Die meerderheid van 'n maatskappy se verpligtinge is in die vorm van kwartaalikse swewendekoers effekte wat verstryk oor 2 jaar Die volgende vier kwartale se rentekoers bewegings is nie vir die maatskappy 'n probleem nie maar wel bewegings daarna Identifiseer die mees geskikte strategie wat die maatskappy instaat sal stel om die verwagte bewegings te verskans

1. **Go long a payer swaption with a one-year maturity.**
   Verkry 'n lang posisie betrekkende ruilopsie met 'n jaar termyn
2. **Go long a receiver swaption with a one-year maturity.**
   Neem 'n lang posisie met 'n ontvangende ruilopsie wat 'n een jaar termyn het
3. **Enter into a two-year, quarterly pay-floating, receive-fixed swap.**
   Gaan 'n 2 jaar ontvanger ruilopsie aan wat kwartaaliks 'n swewende bedrag betaal
4. **Enter into a one-year quarterly pay fixed, receive-floating swap.**
   Gaan 'n 1 jaar ontvanger ruilopsie aan wat kwartaaliks 'n vaste bedrag betaal

Use the following information to answer questions 32 and 33
Gebruik die volgende inligting om vraag 32 en 33 te beantwoord

Gordon Maravanyika is a swap dealer considering taking a position in a one year swap with quarterly payments. Assume a notional principal of $10 million. The annualized LIBOR spot rates today are:
Gordon Maravanyika is 'n ruilkontrak handelaar en oorweeg dit om 'n posisie in 'n 1 jaar ruilopsie met kwartaalikse betalings aan te gaan Aanvaar 'n hoofskuld van $ 10 miljoen Die jaarlikse LIBOR lokokoers is vandag

$L_0(90) = 0.030$
$L_0(180) = 0.030$
$L_0(270) = 0.035$
$L_0(360) = 0.045$

Use the following formulas to assist you in your calculations:
Maak gebruik van die volgende formules indien nodig

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

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

32. If Gordon Maravanyika is a fixed rate payer how much will he pay quarterly on the notional principal of $10 million?
As Gordon Maravanyika 'n vaste koers betaler is, hoeveel dollar sal hy kwartaalliks betaal op 'n $ 10 miljoen hoofskuld?

1. **$148,000.00**
2. **$138,766.12**
3. **$120,283.16**
4. **$110,000.00**

33. Calculate the market value of the swap 55 days later from the point of view of Gordon Maravanyika i.e. paying the fixed rate and receiving the floating rate. At day 55 the new term structure of LIBORs are as follows:
Bereken die markwaarde van die ruilopsie 55 dae later vanuit die posisie van Gordan Maravanyika maw die betaling van 'n vaste koers en die ontvangs van 'n swewende koers Op dag 55 is die nuwe LIBOR koerse

$L_{55}(35) = 0.035$
$L_{55}(125) = 0.037$
$L_{55}(215) = 0.038$
$L_{55}(305) = 0.035$

1. **$118,000.00**
2. **–$104,000.00**
3. **$100,000.00**
4. **–$100,000.00**

Use the following data to answer questions 34 through 36
Gebruik die volgende inligting om vraag 34-36 te beantwoord

Consider a 3-year annual currency swap that takes place between a firm in South Africa (Sifikile Holdings) and an American firm (Trump Towers). Trump Towers is a fixed rate payer and Sifikile 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/$.
Veronderstel dat 'n valuta ruilkontrak jaarlikse betalings maak en 'n 3 jaar termyn het, die kontrak vind plaas tussen Sifikile Holdings (RSA) en Trump Towers (VSA) Trump Towers is 'n vaste koers betaler en Sifikile Holdings is 'n swewendekoers betaler Die vaste rentekoers by die aanvang van die ruilkontrak is 4% en aan die einde van die kontrak 6% Die veranderlike koers is tans 3%, aan die einde van jaar 1, 4%, einde van jaar 2, 6% en 4% aan die einde van jaar 3 Aan die begin van die ruilkontrak is $5 miljoen geruil teen R7 77/$ Aan die einde van die ruilkontrak is die wisselkoers R7 33

Note: with currency swap, end of period payments are based on beginning of period interest rates.
Let wel Met valuta ruilkontrakte is eind termyn betalings gebaseer op die begin termyn rentekoerse

34. At the initiation of the swap which statement is most likely correct?
Identifiseer die mees korrekte stelling itv die begin van die ruilkontrak

1. **Sifikile Holdings receives R27.99 million from Trump Towers.**
   Sifikile Holdings ontvang R27 99 miljoen vanaf Trump Towers
2. **Trump Towers receives R38.85 million from Sifikile Holdings.**
   Trump Towers ontvang R38 85 miljoen vanaf Sifikile Holdings
3. **Sifikile Holdings pays Trump Towers $5 million.**
   Sifikile Holdings betaal Trump Towers $5 miljoen
4. **Trump Towers pays Sifikile Holdings R5 million.**
   Trump Towers betaal Sifikile Holdings R5 miljoen

35. At the end of year 2:
Aan die einde van jaar 2

1. **Sifikile Holdings pays R1,500,000; Trump Towers pays $250,000**
   Sifikile Holdings betaal R1,500,000, Trump Towers betaal $250,000
2. **Sifikile Holdings pays $200,000; Trump Towers pays R1,554,000**
   Sifikile Holdings betaal $200,000, Trump Towers betaal R1,554,000
3. **Sifikile Holdings pays R200,000; Trump Towers pays $19,000**
   Sifikile Holdings betaal R200,000, Trump Towers betaal $19,000
4. **Sifikile Holdings pays $250,000; Trump Towers pays R1,500,000**
   Sifikile Holdings betaal $250,000, Trump Towers betaal R1,500,000

36. At the end of year 3, Sifikile Holdings will pay which of the following total amounts?
Aan die einde van jaar 3 sal Sifikile Holdings 'n totale bedrag van betaal

1. **$5,300,000**
2. **$5,240,000**
3. **R5,225,000**
4. **R1,614,900**

37. Indicate the correct statement from the following alternatives:
Identifiseer die korrekte stelling van die volgende alternatiewe

1. **Payoffs on an interest rate swaption are like those of an option on a zero-coupon bond.**
   Afbetalings van 'n rentekoers ruilkontrak opsie is soortgeyk aan die van 'n nul-koepon effek
2. **Swaptions are not based on specific underlying swaps but have a set exercise and expiration date.**
   Ruilkontrak opsies is nie gebaseer op spesifieke ruilkontrakte nie maar het 'n uitoefening verstrykingsdatums
3. **A swaption is the option to enter into a swap contract and gives the user more flexibility.**
   'n Ruilkontrak opsie is die opsie om 'n ruilkontrak aan te gaan en gee 'n verbruiker meer buigsaamheid
4. **A swaption is not a derivative**
   'n Ruilkontrak opsie is nie 'n afgeleide instrument nie

Use the following data to answer question 38.
Gebruik die volgende inligting om vraag 38 te beantwoord

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
Veronderstel 'n Europese ontvanger ruilkontrak opsie wat verstryk in een jaar wat se onderliggende bate 'n 2 jaar ruilkontrak is wat halfjaarlikse betalings maak Die ruilopsiekontrak het 'n uitoefen koers van 6% en die hooskuld is $50 miljoen By verstrykingsdatum is die rentekoerse

$L_0(180) = 0.06$
$L_0(360) = 0.07$
$L_0(540) = 0.06$
$L_0(720) = 0.05$

38 Calculate the market value of the swaption at expiration:
Bereken die markwaarde van die ruilkontrak opsie op die verstrykingsdatum

1. **$1,500,000.00**
2. **$1,714,000 00**
3. **$1,501,250.00**
4. **$1,045,000.00**

39 In a plain vanilla interest rate swap:
Mbt 'n gewone vanielje rentekoers ruilkontrak

1. **The notional principal is swapped**
   Die hoofskuld word geruil
2. **Only the net interest payments are made.**
   Slegs die netto rente-betalings word betaal
3. **The notional principal is returned at the end of the swap**
   Die hoofskuld word terug geruil aan die einde van die ruilkontrak
4. **The fixed rate is swapped for a fixed rate payment.**
   Die vaste rentekoers is verruil vir 'n vaste koers betaling

40 Abigail Marozva is an asset manager at Eagle Management Company who wishes to reduce her exposure to equities and increases her exposure to fixed-income securities She agrees to pay the dealer returns on a large-cap index, and the dealer agrees to pay Abigail a fixed rate of 8%. Calculate the overall payment three months later and indicate which party makes the payment, if the value of the large-cap index start off at 696.44 and three months later is at 723.42. Assume that the payments are made quarterly. The notional principal is $20 million.
Abigail Marozva is 'n batebestuurder by Eagle Bestuursmaatskappy, sy wil haar blootstelling aan aandele verminder en haar blootstelling aan vaste-inkomste-effekte verhoog Sy kom met die handelaar ooreen om die opbrengs op 'n groot-kap indeks te betaal en die handelaar is dit eens om Abigail 'n vaste koers van 8% te betaal Bereken die totale betalings na drie maande en dui aan watter party maak die betaling, indien die waarde van die groot-kap indeks 696,44 was en drie maande later 723,42 is Aanvaar kwartaalikse betalings op die hoofskuld van $20 miljoen

1. **$370,000.00** **Asset manager pays dealer.**
   $370,000 00 *Batebestuurder betaal handelaar*
2. **$374,000.00** **Asset manager pays dealer.**
   $374,000 00 *Batebestuurder betaal handelaar*
3. **$770,000.00** **Dealer pays asset manager.**
   $770,000 00 *Handelaar betaal batebestuurder*
4. **$886,565.10** **Dealer pays asset manager.**
   $886,565 10 *Handelaar betaal batebestuurder*

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

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1. GEBRUIK SLEGS N HB-POTLOOD OM HIERDIE BLAD TE VOLTOOI
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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