

FACULTY OF SCIENCE

DEPARTMENT OF MATHEMATICS AND APPLIED MATHEMATICS

MODULE: MATHEMATICS FINANCE AND BUSINESS 1B- MATDCB1

CAMPUS: APK/SWC

ASSESSMENT: SUPPLEMENTARY EXAMINATION 2021

DATE:

ASSESSORS:	DR A ALOCHUKWU
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INTERNAL MODERATOR: MS M JUGA

DURATION:	2 HOURS + 1 HOUR

54	
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INITIALS AND SURNAME:

STUDENT NUMBER:

CONTACT NUMBER:

NUMBER OF PAGES: 6 (INCLUDING COVER PAGE)

INSTRUCTIONS:

- ANSWER ALL THE QUESTIONS IN PEN.
- ALL GRAPHS MUST BE DRAWN IN PEN.
- NO PENCIL OR TIPEX ALLOWED.
- SHOW ALL THE NECESSARY CALCULATIONS CLEARLY.
- IF FORMULAS ARE USED THEY MUST BE STATED AS MARKS ARE GIVEN TO THEM.
- ONLY SCIENTIFIC CALCULATORS ARE ALLOWED.
- IF NECESSARY, ROUND OFF TO TWO DECIMAL PLACES.
- THE QUESTIONS CAN BE ANSWERED IN ANY ORDER.

Question 1 (This question will be answered directly on blackboard) [20]

Choose the correct answer by writing only the corresponding letter

- (e.g 1.1. A
 - 1.2. C
 - etc.)
- 1.1. An amount of R 40 000 is deposited at the savings account with the interest rate of 10% compounded monthly. How many years will it take to totalise R 120 000?
- A. 10.03 years
- B. 11.03 years
- C. 11.00 years
- 1.2. An amount of R 100 000 is deposited into the savings account with a rate of 0.1% compounded continuously. How much will be the amount in 6 years?
- A. R 182 211.88
- B. R 200 211.88
- C. R 92 211.88
- 1.3. Find the present value of an annuity of R 2 500 paid monthly for five years at the rate of 6% compounded monthly.
- A. R 42 921.60
- B. R 57 809.17
- C. R 175 297.20
- D. R 129 313.90

- 1.4. Find the present value of an annuity of R 2 500 semi-annually for four years and thereafter R 3 150 semi-annually for one year. Given an interest rate of 7.5% compounded semi-annually.
- A. R 21 448.46
- B. R 30 292.1
- C. R 130 318.80
- D. R 22 969.54
- 1.5. Find an equation of the tangent line to the curve $y = 3x^2 4x + 1$ at the point where x = 0
- A. y = 4x 1
- B. y = -4x + 4
- C. y = -4x 1
- D. y = 4x 4
- 1.6. Find the derivative of the function $f(x) = \frac{x^2}{2} + \frac{3}{x^3}$.
- A. $f'(x) = x + \frac{1}{x^2}$
- B. $f'(x) = 4x + \frac{1}{x^2}$
- C. $f'(x) = x \frac{9}{x^4}$ D. $f'(x) = x + \frac{9}{x^4}$
- 1.7. The slope of the curve $y = (x^2 4)(x^2 + 4)$ at x = 1 is equal to:
- A. 0
- B. 1
- C. 4

- 1.8. Given $X \sim N(25, 16)$, find P(X > 18).
- A. 0.9599
- B. 0.0401
- C. 0.4599
- D. 0.3300
- 1.9. The standard deviation of the series: 2 4 6 8 is:
- A. $\sqrt{7}$
- B. $\sqrt{5}$
- C. $\sqrt{2}$
- 1.10. Given the following probabilities: P(A) = 0.2; P(B) = 0.5 and knowing that events A and B are independent; P(AUB) is equal to:
- A. 0.6
- B. 0.4
- C. 0.06

Question 2

- 2.1. How many years will it take a deposit of R 20 000 to increase to R 25 000 if invested at an interest rate is 6% compounded annually? [3]
- 2.2. An investment company offers a continuous interest rate of 6%. If R 15 000 may be accumulated after 3 years, find a required principal. [2]

Question 3

A debt of R 600 000 due six years from now is to be repaid by a payment of R 150 000 in three years, a payment of R 250 000 in four years, and a final payment at the end of five years. Interest rate is 7% compounded annually.

3.1.	Draw a time line that shows all debts and payments.	[1]
3.2.	Determine the final payment.	[4]

Question 4

A business guarantees you cash flows of R 85 000, R 90 000 and R 115 000 at the end of years 4, 6 and 7 respectively if you invested R 220 000. Find the net present value of the cash flows if the interest rate is 8% compounded semi-annually. [4]

Question 5

Determine the third derivative of:
$$y = \frac{x+2}{x-3}$$
 [4]

Question 6

Find an equation of the tangent line to the curve $y = x^3 \ln(2 - x)$ at x = 1. [5]

Question 7

Suppose the National Grade 12 Mathematics marks of a country are normally distributed with mean of 38% and standard deviation of 4%. Find the probability of selecting a Grade 12 learner, at random, that obtained a mark less than 49%. [3]

Question 8

A six-sided die is rolled, and the following events are considered:

- A = Obtaining an odd number.
- B = Obtaining a number greater than 4.
- 8.1. Calculate the probabilities P(A), P(B).[2]8.2. Write down the elements of $A \cap B$ in set form[1]8.3. Calculate the following probabilities:[1]i) $P(A \cup B)$ [1]
 - ii) $P(\overline{A \cup B})$ [1]

Question 9

A symmetric coin is tossed three times.

9.1.	Use a tree diagram to show all the possible outcomes as head (H) or tai	
		[1]
9.2.	Find the probability of obtaining at least 2 heads.	[2]

End of Assessment – Total Marks 34