UNIVERSITY
OF
JOHANNESBURG

FACULTY OF SCIENCE

DEPARTMENT OF MATHEMATICS AND APPLIED MATHEMATICS

MODULE: **BASIC MATHEMATICS AND APPLICATIONS IN ECONOMICS AND BUSINESS A – MAEB311 and MAEB0A1**

CAMPUS: **APK**

ASSESSMENT: EXAM

DATE: **8 JUNE 2019**

ASSESSORS: **MR W CHUKWU**
                                    MS T OBERHOLZER

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INTERNAL MODERATOR: MR MSW POTGIETER

DURATION: **2 HOURS**

INITIALS AND SURNAME: _____

STUDENT NUMBER: _____

CONTACT NUMBER: _____

NUMBER OF PAGES: **12 (INCLUDING COVER PAGE)**
INSTRUCTIONS:

- **ANSWER ALL THE QUESTIONS IN PEN ON THE TEST SCRIPT**
- **ALL GRAPHS MUST BE DRAWN IN PEN**
- **NO PENCIL OR TIPEX ALLOWED**
- **STATE ALL FORMULAS USED – MARKS ARE AWARDED TO FORMULAS**
- **SHOW ALL THE NECCESARY CALCULATIONS**
- **IF NECESSARY, ROUND OFF TO TWO DECIMAL PLACES**
- **SCIENTIFIC CALCULATORS ARE ALLOWED**

Question 1 [10]

For questions 1.1 to 1.10, choose the correct answer, and make a cross (X) in the correct block.

QUESTION	SELECT ANSWER					CORRECTION
1.1	A	B	C	D	E	
1.2	A	B	C	D	E	
1.3	A	B	C	D	E	
1.4	A	B	C	D	E	
1.5	A	B	C	D	E	
1.6	A	B	C	D	E	
1.7	A	B	C	D	E	
1.8	A	B	C	D	E	
1.9	A	B	C	D	E	
1.10	A	B	C	D	E	

1.1 Simplify the following expression: $\left(\frac{27t^3}{8}\right)^{2/3}$

    A. $\frac{-9t^2}{4}$

    B. $\frac{4t^2}{9}$

    C. $\frac{-27}{6}$

    D. $\frac{9t^2}{4}$

    E. None of the above

1.2 Solve the following equation: $\frac{w^2-18w}{w}$

    A. $w + 8$
    B. $-w - 8$
    C. $w - 18$
    D. $w + 18$
    E. None of the above

1.3 Solve the following equation: $\qquad$ $3x^2 - 27 = 0$

      A. $x = 0$ or $x = -3$
      B. $x = 3$ or $x = -3$
      C. $x = 3$ or $x = 0$
      D. $x = 4$
      E None of the above

1.4 Find the function value for $g\left(\frac{1}{16}\right)$ given that:

$$g(u) = \frac{4}{\sqrt{4u}}$$

      A. -8
      B. 8
      C. $\frac{-4}{8}$
      D. $-\frac{1}{16}$
      E. None of the above

1.5 Find the domain of the function below: $\quad 7x^2 - 15x + 19 = 0$

      A $x \in [-\infty, \infty]$
      B. $x = \emptyset$
      C. $x \in (-\infty, \infty]$
      D. $x \in (-7, 19)$
      E. None of the above

1.6 The coordinate pair $\left(2\frac{1}{2}, -4\right)$ is located in WHICH quadrant of the x, y-plane?

      A. Quadrant I
      B. Quadrant II
      C. Quadrant III
      D. Quadrant IV
      E. None of the above

1.7 The slope of the straight line that passes through $(1, -2)$ and $(3,5)$ is:

   A. $-\frac{7}{2}$

   B. $\frac{7}{2}$

   C. $\frac{2}{7}$

   D. $-\frac{2}{7}$

   E. None of the above

1.8 The slope of a straight line that is perpendicular to the line $3y = -\frac{2}{5}x + 3$ is equal to:

   A. $-\frac{2}{5}$

   B. $\frac{5}{2}$

   C. $\frac{2}{15}$

   D. $\frac{15}{2}$

   E. None of the above

1.9 How long will it take R600 in years to amount to R900 at an annual rate of 6% compounded quarterly?

   A. 7 years

   B. 6 years $9\frac{1}{2}$ months

   C. 6 years 10 months

   D. 28 years

   E. None of the above

1.10 What is the compound amount at the end of 5 years, if R100 is invested at annual rate of 5%, compounded continuously?

   A. R125.00

   B. R127.63

   C. R128.40

   D. R128.41

   E. None of the above

Question 2

[7]

Simplify the following expressions completely:

2.1 $\left(\dfrac{16x^3n^{-4}p^{-3}}{64p^{-2}x^{-4}}\right)^3$ [4]

2.2 $\dfrac{x^2+2x+1}{x^2-4} \div \dfrac{(x+1)^2}{3x-6}$ [3]

Question 3

[4]

Perform the following operation by means of long division:

$$(2x^3 + 5x^2 + 6x + 1) \div (1 + 2x)$$

Question 4 **[2]**

Rationalize the denominator

$$\frac{\sqrt{p}}{\sqrt{q} - \sqrt{r}}$$

Question 5 [4]

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Noma wishes to invest a total of $R20,000.00$ in two enterprises so that the total income per year will yield R1 440.00 One enterprise pays 6% annually and the other has more risk and pays $7\frac{1}{2}\%$ annually. How much interest must be invested in each enterprise?

Question 6

[3]

Find the equation of the line that passes through $(5,2)$ and is perpendicular to $y = -3x$.
(Show ALL calculations)

Question 7

[3]

Suppose a manufacturer of shoes will place on the market 50 pairs when the price is R35 (per pair) and 35 when the price is R30. Find the supply equation, assuming that price p and quantity q, are linear related.

Question 8

[7]

Given that $\qquad h(t) = t^2 + 6t + 9$
(Show ALL steps in the following calculations)

8.1 Determine the vertex $\qquad$ [2]

8.2 Determine the t-intercept(s) $\qquad$ [1]

8.3 Determine the h- intercept(s) [1]

8.4 Determine the range [1]

8.5 Sketch the graph of $h(t)$. [2]

Question 9 [14]

Solve for x:

9.1 $\sqrt[2]{3x + 1} - 3 = 7$ [3]

9.2 $\log_x(12 - x) = 2$ [3]

9.3 $e^{2x-5} + 1 = 4$ [3]

9.4 Find the value for $\ln e + \log \frac{1}{10}$ [2]
     (Show all steps, do not use a calculator)

9.5 Solve the inequality for x and represent your answer on a number line   [3]

$$9 \le \frac{1 - 2x}{3} < -5$$

Question 10

[3]

Solve the following system of equations algebraically:

$$4x+12y=12$$
$$2x+4y=12$$

Question 11

[3]

A R4 000 certificate of deposit is purchased for R4 000 and is held for eleven years. If the certificate earns an effective rate of 7% compounded p.a., what is its worth at the end of that period?

End of Assessment – 60 Total Marks

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Use this space to redo a question. Clearly indicate at the question that the solution is on page 12.