

UNIVERSITY OF SWAZILAND

FINAL EXAMINATIONS 2009/2010

B.A.S.S. I / D.COM I

TITLE OF PAPER : INTRODUCTORY MATHEMATICS FOR BUSINESS

COURSE NUMBER : MS 101 AND IDE MS101

TIME ALLOWED : THREE (3) HOURS

INSTRUCTIONS : 1. THIS PAPER CONSISTS OF
SEVEN QUESTIONS.
2. ANSWER ANY FIVE QUESTIONS
3. USEFUL FORMULAE ARE PROVIDED
AT THE END OF THE QUESTION PAPER.

SPECIAL REQUIREMENTS : NONE

THIS EXAMINATION PAPER SHOULD NOT BE OPENED UNTIL
PERMISSION HAS BEEN GRANTED BY THE INVIGILATOR.

QUESTION 1

1. (a) Use long division to find the quotient and remainder when $x^4 - 3x^3 + 2x^2 - 5$ is divided by $x^2 - x + 1$. [6 marks]
- (b) When $4x^3 + px^2 + 5x + q$ is divided by $(x + 2)$ the remainder is -35.
When it is divided by $x - 5$ the remainder is 574.
What are the values of p and q ? [7 marks]
- (c) Find all the real roots of the polynomial $x^4 + 9x^3 + 21x^2 - x - 30 = 0$ [7 marks]

QUESTION 2

2. (a) Solve the following equations for x
- (i) $\log_2 x + \log_2(x - 7) = 3$ [5 marks]
- (ii) $2^{x+1} = 3^{x-1}$ [5 marks]
- (b) Sipho wants to buy a new computer after three years that will cost E5000. How much should he deposit now, at 6% interest compounded monthly to give the required E5000 in 3 years? [5 marks]
- (c) Find the time required to treble a certain amount compounded continuously at 12% interest. [5 marks]

QUESTION 3

3. (a) Prove the following trigonometric identities

i. $\tan \theta + \cot \theta = \sec \theta \csc \theta$ [6 marks]

ii. $(1 - \cos \theta)(1 + \sec \theta) = \sin \theta \tan \theta$ [4 marks]

(b) Solve the trigonometric equation

$$2 \sin^2 x + 3 \cos x - 3 = 0$$

giving all solutions between 0° and 360° . [6 marks]

(c) Use the sum-difference formulas to find the exact value of $\sin 15^\circ$

[4 marks]

QUESTION 4

4. (a) Use the general formula for the r th term to find the coefficient of x^6 in the binomial expansion of

$$(2 + x^2)^8$$

[5 marks]

(b) Write the first five (5) terms in the expansion of $(1 + x)^{-3}$

[5 marks]

(c) Use Cramer's rule to solve the following system of equations

$$x + 2y + z = 1$$

$$x - y - z = 0$$

$$2x + y + z = 3$$

[10 marks]

QUESTION 5

5. (a) Find the sum of the series $2 + 5 + 8 + \dots + 1001$. [5 marks]
- (b) An auditorium has 40 rows with 30 seats in the first row, 33 in the second row, 36 in the third row, and so forth. How many seats are in the auditorium? [5 marks]
- (c) The fourth term of a geometric progression is 1 and the eighth term is $\frac{1}{256}$. Find the tenth term. [5 marks]
- (d) Convert 3.3818181 into an equivalent common fraction [5 marks]

QUESTION 6

6. (a) Find the equation of a straight line passing through the intersection of $3x - y = 9$ and $x + 2y = -4$, perpendicular to $3 = 4y + 8x$ [7 marks]
- (b) Find the centre and radius of a circle defined by the equation
- $$x^2 - 6x + y^2 + 10y + 25 = 0.$$
- [6 marks]
- (c) Find the equation of the line that passes through the points (2, 4) and (1, 2). [7 marks]

QUESTION 7

7. (a) Solve the complex quadratic equation

$$z^2 - (3 - i)z + 4 = 0$$

and express your answer in the form $x + iy$

[10 marks]

- (b) Prove by mathematical induction that the following formula

$$5 \cdot 6 + 5 \cdot 6^2 + 5 \cdot 6^3 + \cdots + 5 \cdot 6^n = 6(6^n - 1)$$

is valid for all positive integers.

[10 marks]

END OF EXAMINATION

Useful Formulas

1. $\sin^2 \theta + \cos^2 \theta = 1$
2. $\sin(A + B) = \sin A \cos B + \cos A \sin B$
3. $\sin(A - B) = \sin A \cos B - \cos A \sin B$
4. $\cos(A + B) = \cos A \cos B - \sin A \sin B$
5. $\cos(A - B) = \cos A \cos B + \sin A \sin B$
6. $2 \cos A \cos B = \cos(A + B) + \cos(A - B)$
7. $\sin 2A = 2 \sin A \cos A$
8. $\cos 2A = \cos^2 A - \sin^2 A$
9. $\cos 2A = 2 \cos^2 A - 1$
10. $\cos 2A = 1 - 2 \sin^2 A$

Degrees	0°	30°	45°	60°	90°
$\sin \theta$	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
$\cos \theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
$\tan \theta$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	