

UNIVERSITY OF SWAZILAND

SUPPLEMENTARY EXAMINATIONS 2006

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 the long division method to find the quotient and the remainder when $P(x) = x^4 - 3x^3 + 2x - 5$ is divided by $D(x) = x^2 - x + 1$. [6 marks]
- (b) When the polynomial $x^4 + ax^3 + 11x^2 + bx = 12$ is divided by $(x + 2)$ the remainder is 6. Given that $(x + 4)$ is a factor of the polynomial, find the values of a and b . [7 marks]
- (c) Find all the real roots of the polynomial
- $$x^4 + 9x^3 + 21x^2 - x - 30 = 0. \quad [7 \text{ marks}]$$

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) Express $\cos(-840^\circ)$ as a cosine of an acute angle [3 marks]

(b) Prove the following trigonometric identities

i. $\tan \theta + \cot \theta = \sec \theta \csc \theta$ [4 marks]

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

(c) Solve the trigonometric equation

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

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

(d) Without using calculators, find the exact value of $\cos 105^\circ$. [3 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

$$(1 + x^2)^8$$

[5 marks]

(b) Write out the first four terms in the expansion of $(1 + x)^{-2}$ and use this expansion to estimate $(1.02)^{-2}$ correct to four significant figures. [6 marks]

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

$$x + 2y + z = 1 \quad [9 \text{ marks}]$$

$$x - y - z = 0$$

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

QUESTION 5

5. (a) If the 8th term of a geometric progression is 243 and the 5th term is 9, find the first three terms of the geometric progression. [5 marks]
- (b) Find the 20th term of the geometric progression 2, 10, 50, 250,.... [5 marks]
- (c) Find three numbers in arithmetic progression such that their sum is 15 and their product is 80. [5 marks]
- (d) Convert 0.818181 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 $x + 2y = -4$, parallel 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 a circle that passes through the points (0,0), (3,1) and (3,9). [7 marks]

QUESTION 7

7. (a) Express the following expressions in the complex form $a + bi$

(i) $(2 - 3i)(3 + 4i)$ [4 marks]

(ii) $\frac{9 - 2i}{4 + 3i}$ [6 marks]

(iii) $\sqrt{2}(\cos 135 + i \sin 135)$ [4 marks]

(b) Write the complex number $z = -3\sqrt{3} + 3i$ in mod-arg form. [6 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. $\cos 2A = \cos^2 A - \sin^2 A$

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	$\sqrt{3}$	