1ST SEM. 2006/2007

UNIVERSITY OF SWAZILAND

SUPPLEMENTARY EXAMINATION PAPER

PROGRAMME: ALL FIRST YEARS

COURSE CODE: AEM 101

TITLE OF PAPER: MATHEMATICS

TIME ALLOWED: TWO (2) HOURS

INSTRUCTION:

1. ANSWER ALL QUESTIONS IN SECTION I AND ANY THREE QUESTIONS IN SECTION II
2. SHOW ALL WORKINGS ON THE QUESTION PAPER

DO NOT OPEN THIS PAPER UNTIL PERMISSION HAS BEEN GRANTED BY THE CHIEF INVIGILATOR

Candidate's Seat Number: _____

Candidate's Identity Number: _____

Candidate's Programme of Study: _____

Time and Date of Examination: _____

FOR EXAMINER'S USE ONLY

Section	Possible Marks	Internal Examiner	Signature	External Examiner	Signature
I	40				
II	60				
Total	100				

SECTION I: ANSWER ALL QUESTIONS IN THIS SECTION

Part 1: Multiple Choice: For each item, circle the one letter of the choice that best completes/answers that item. The space next to each question can be use to work out the question before making a choice.

1. If £60 is worth US $90, then US $36 is worth:

   a) £54
   b) £24
   c) £62
   d) £18
   e) Not given. Answer is ..... (2 marks)

2. Two numbers, when added equal 17. The first numbers minus the product of 3 times the second number equals 5. What are the 2 numbers, in order?

   a) 16 and 1
   b) 15 and 2
   c) 14 and 3
   d) 13 and 4
   e) Not given. The answer is ..... (3 marks)

3. A, B and C share a sum of money in ratio 7: 5: 14
   If B receives £18 less than C then C receive:

   a) £28
   b) £14
   c) £10
   d) £52
   e) Not given. Answer is ..... (3 marks)

4. If a retailer buys an item for £64 and sells it for £50, the result is a:

   a) Profit of 28%
   b) Profit of 21.88%
   c) Loss of 28%
   d) Loss 0f 21.88%
   e) Not given. Answer is ..... (2 marks)

5. If you differentiate $y = 2x^6$ the result is

   a) $2x^5$
   b) $\frac{2x^7}{7}$
   c) $12x^5$
   d) $12x^6$
   e) Not given. Answer is ..... (2 marks)

6. If you differentiate $y = \frac{3}{7x^{-2}}$, the answer is

a) $\frac{6}{7}x$

b) $\frac{3}{7}x^{-2}$

c) $\frac{-6}{7}x^{-3}$

d) $\frac{-3}{7}x^{-3}$

e) Not given. Answer is ..... (2 marks)

7. The average of three numbers is 116. The average of two of them is 98. The third number is

a) 18
b) 107
c) 110
d) 152
e) Not given. Answer is ..... (3 marks)

8. Simplify the following: (3 marks)

(a) $\frac{(3\frac{1}{2} \times 1\frac{1}{2}) - 3}{9}$

(b) $(2\frac{2}{9} \times 1\frac{1}{5}) + 1\frac{5}{6}$ (3 marks)

9. A bill for £74 was paid with £5 and £1 notes, a total of 50 notes being used. If x is the number of £5 notes used then:

a) $x + 5(50 - x) = 74$
b) $5x + (50 - x) = 74$
c) $5x + (74 - x) = 50$
d) $x + 5(74 - x) = 50$
e) Not given, answer is ..... (3 marks)

10. The value of $x^2 + y^2 + z^2 - 3yz$ when $x = -2$, $y = 3$, $z = -4$ is
a) 25
b) –47
c) –7
d) 65
e) Not given, answer is ..... (2 marks)

11. If $x = 2y - \frac{w}{v}$ then v is equal to

a) $\frac{w}{2y - x}$

b) $\frac{2y - x}{w}$

c) $\frac{-w}{x - 2y}$

d) $\frac{-w}{2y - x}$

e) Not given, answer is ..... (3 marks)

12. By eliminating x from the simultaneous equation:

$2x - 5y = 8$
$2x - 3y = -7,$
The equation below is obtained:

a) $-8y = 1$
b) $-2y = 15$
c) $-8y = 15$
d) $-2y = 1$ (2 marks)
e) Not given, answer is .....

13. If $\frac{2}{x+1} - 3 = \frac{1}{x-2}$ then

a) $3x^2 + 2x + 11 = 0$
b) $-3x^2 - 2x - 11 = 0$
c) $3x^2 - 4x - 1 = 0$
d) $-3x^2 + 4x + 1 = 0$
e) Not given, answer is ..... (3 marks)

14. $y^2 \times y^{-1/2}$ equals:

a) y^{-1}
b) y^{-4}
c) $y^{3/2}$
d) $y^{5/2}$
e) Not given, answer is ..... (2 marks)

15. If $y = \frac{3x^3 - 2x^2}{x}$, then $\frac{dy}{dx}$ is equal to

a) $9x^2 - 4x - \frac{1}{x^2}$

b) $9x^2 - 4x + \frac{1}{x^2}$

c) $6x - 2$

d) $2 - 6x$

e) Not given, answer is ..... (2 marks)

SECTION II: ANSWER ANY THREE QUESTIONS

Show all of your work: Answer each question in the space provided.
All Questions in this section carry equal marks (20 marks)

Question 1

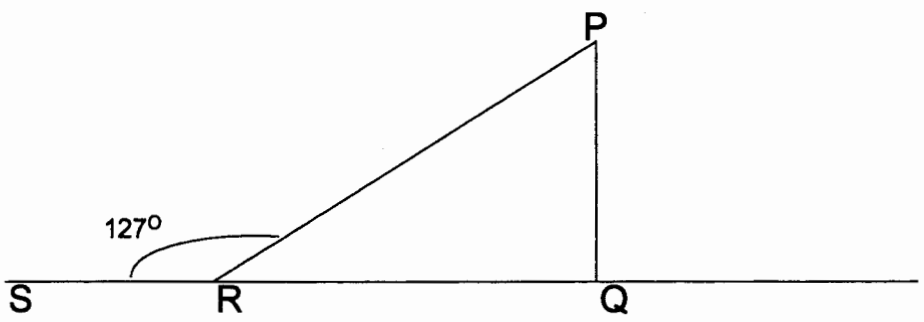
a) Find the values of 'm' and 'c' if the straight lime y = mx +c passes through the points (3, 4) and (7, 10)

(5 marks)

b) Given that PR = 10 cm, $P\hat{Q}R = 90^0, P\hat{R}S = 127^0$ and that QRS is a straight line, Calculate the length of:

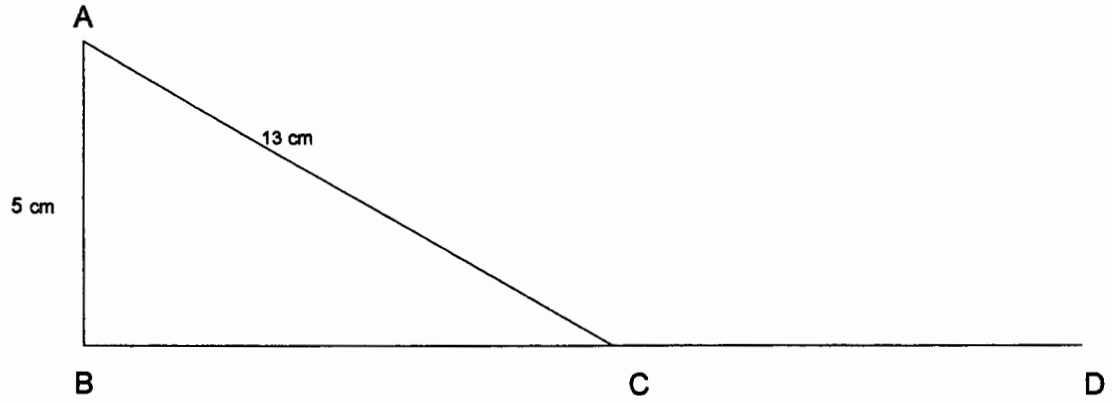
(10 marks)

(i) RQ
(ii) QP



c) ABC is a right-angled triangle in which $A\hat{B}C = 90^0, AB = 5cm$ and $AC = 13cm$. The Point D lies on BC produced.

(5 marks)



a) Calculate BC

b) Write down, as fractions the values of:

(i) Sin $A\hat{C}D$

(ii) Cos $A\hat{C}D$

(iii) Tan $A\hat{C}D$

Question 2

a) Simplify each of the following, expressing them as single fractions in their lowest terms:

i) $\frac{2x-5}{5x}-\frac{3x+2}{4x}+\frac{7x+15}{10x}$ (3 marks)

ii) $\frac{2x-1}{2x^2+5x-3}$ (3 marks)

iii) $\frac{3w}{4y} - \frac{w}{5y}$ (3 marks)

iv) $\frac{x+2}{x+1} - \frac{3x-1}{3x+3}$ (3 marks)

(v) $\frac{2x^2+5x+3}{x^2+6x+5} = \frac{2x+3}{x+5}$ (2 marks)

(b) Find the value of the following, expressing the answer in standard form to 2 significant figures:

$$\frac{700x80x1728}{500x6}$$

(3 marks)

(c) Factorise $8(x-y)^2-4(y-x)$ (3 marks)

Question 3

The lengths of telephone calls from a certain office were noted and the results are shown below giving the times in seconds.

141	43	203	104	82	63	24	84	41	86	47	43
100	53	139	147	137	186	214	106	150	109	170	172
194	124	175	177	162	129	128	219	40	105	48	65
105	154	154	35	149	54	104	109	119	74	140	104
168	127	191	30	109	88	104	207	38	164	182	120
166	53	145	29	112	143	49	199	130	52	109	77
142	75	146	105	125	112	40	126	67	49	90	140
132	118	134	133	159	123	161	112	157	104	92	112
151	98	156	117	156	190	122	135	116	96	163	116
186	155	106	153	69	105	136	106	131	118	94	121

a) Arrange these lengths in a grouped frequency distribution using the intervals, 0-19, 20-39, 40-59, 60-79, 80-99, 100-119, 120-139, 140-159, 160-179, 180-199, and 200-219.

(7 marks)

b) Draw a histogram of the data given. (7 marks)

c) Find the arithmetic mean (6 marks)

Question 4

a) Evaluate the following integral:

$$\int x^2 - 5x + \frac{1}{\sqrt{x}} + \frac{2}{2x^2}$$ (5 marks)

(b) Evaluate the following definite integrals

$$\int_1^2 \frac{1}{x^{-2}} dx$$ (5 marks)

c) Calculate the coordinates of the points on the curve $y = x^3 - 3x^2 - 9x + 12$ at which the tangent to the curve is parallel to the x-axis. (5 marks)

d) A curve has the equation $y = 8 + 2x - x^2$. Find the value of x for which the gradient of the curve is 6.

(5 marks)

END OF EXAM

GOOD LUCK!!!