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University Examinations 2014/2015

EXAMINATION FOR CERTIFICATE IN BRIDGING MATHEMATICS

SMB 0103: BASIC CALCULUS AND MATRICES

DATE: DECEMBER 2014 **TIME: $1\frac{1}{2}$ HOURS**

INSTRUCTIONS:

QUESTION ONE

a) Find the solution of the system by Cramer's rule (4 marks)

x+y=5

3x-2y=0

b) Estimate the area enclosed by the curve y=$\frac{1}{2}x^2$+1,x=0, x=4 and the x-axis using the mid-ordinate rule (4 marks)

c) Evaluate

$$\lim_{x\to 3}\left[\frac{x^2-9}{x-3}\right]$$ (4 marks)

d) Given the A=$\{1,3,5,7\}$, list the members of the following sets.

(i) $(x^3 : x \in A)$ (1 mark)
(ii) $(2x+3 : x \in A$ (1 mark)

e) Find the derivatives $\frac{x^3}{3x+1}$ (4 marks)

f) Given the equation of the curve y=x^2-1, at point (2,3). Find the equation of

(i) tangent (3 marks)

(ii) normal (3 marks)

g) Find the inverse of $\begin{bmatrix} 3 & 2 \\ 0 & 1 \end{bmatrix}$ (3 marks)

h) Evaluate $\int_2^3 \left(x^2+1\right)dx$ (3 marks)

QUESTION TWO

a) The displacement s metres of a particle after t seconds is given by $s=40t^3-t^2+3t+3$. Find its velocity and acceleration when t=2. (6 marks)

b) Use the matrix method to solve (4 marks)

5x+3y=7

2x+y=5

QUESTION THREE

a) Evaluate $\lim_{x\to 4}\left[\frac{x^2+8x+16}{x+4}\right]$ (4 marks)

b) Given that A= $\{-1,0,1,2,3\}$ list the members of the following sets (4 marks)

(i) $\left\{x^2 : x \in A\right\}$

(ii) $\left\{\frac{1}{x} : x \in A\right\}$

(iii) $\{2x : x \in A\}$

(iv) $\{4x+1 : x \in A\}$

c) Find the gradient of $y=x^2$ at x=1 (2 marks)

QUESTION FOUR

a) Use the trapezium rule to estimate the area under the curve $y=2x^2+6$ the x=1 and x=5 and the x-axis. Use 8 strips (5 marks)

b) The demand for the product of a firm varies with the price that the firm charges for the product. The firm estimates that the annual total revenue R as the function of the price P is given by $R=f(p)=100p^2+100p$. Determine the price, which should be charged in order to maximise total revenue. (5 marks)

QUESTION FIVE

a) Estimate the area enclosed by the curve $y=\frac{1}{2}x^2+3$, x=0, x=5 and the x-axis using the mid-ordinate rule. (6 marks)

b) Given that A is the set of odd numbers less than 20 and B is the set of prime number less than 20, list the members of (4 marks)

(i) A

(ii) B

(iii) $A \cap B$

(iv) $A \cup B$

QUESTION SIX

a) Solve the equation using the determinant method (4 marks)

3x+4y=18

x+2y=8

b) Estimate the area enclosed by the curve $y=\frac{1}{2}x^2+1$, x=0, x=4 and the x-axis using the trapezium rule (6 marks)