



KABARAK UNIVERSITY

UNIVERSITY EXAMINATIONS

BRIDGING CERTIFICATE COURSE IN MATHEMATICS

COURSE CODE: BMATH 003

COURSE TITLE: BASIC CALCULUS

STREAM: BRIDGING

DAY: TUESDAY

DATE: 25/08/2009

TIME: 9:00 – 11.00 A.M.

INSTRUCTIONS

Attempt question **ONE** and any other **TWO** questions.

PLEASE TURN OVER

SECTION A

QUESTION ONE(30marks)

a) What do you understand by the following terminologies;

i) a normal and tangent equations

ii) a function

iii) local extrema (6mks)

b) $f(x)=2x^2+x+1$ and $g(x)=3x+2$, find

i) $f(x)+g(x)$ (2marks)

ii) $f(x)-g(x)$ (2marks)

iii) $f(x).g(x)$ (2marks)

iv) $f(x)/g(x)$ (2marks)

c) Using the first principle method, differentiate

i. $Y=x^2+3x-5$ (3marks)

ii. $F(x)=\sqrt{x}$ (3marks)

d) Differentiate the following

i. $Y=x^2+2x^2-x+6$ (1marks)

ii. $h(x)=(2x^3+3)(x^4+1)$ (2marks)

iii. $y=x^2+1/x^2-1$ (2marks)

iv. $y=(x^2+1)^6$ (2marks)

e) Evaluate the limits

i. $\lim_{x \rightarrow 2} x^2 - 25/x - 5$ (2marks)

ii. $\lim_{x \rightarrow 1} x^2 + x/x^2 - 1$ (2marks)

QUESTION TWO (20MARKS)

a) Given $f(x) = 2x^2+1$ and $g(x) = x+1$, find;

i. $f \circ g(x)$ (2marks)

ii. $f(2)$ (2marks)

iii. $ff(2)$ (2marks)

iv. $g \circ f(x)$ (2marks)

v. What is the relationship between (i) and (iv) evaluated above?
(1mark)

b) Verify the following limit

$\lim_{x \rightarrow 1} 5x-3=2$ (3marks)

c) Differentiate;

i. $y=(x^2+2x+10)^{10}$ (2marks)

ii. $y=(3x^2+10)^3(2x+4)$ (3marks)

d) Find the area bounded by the curve $y=3x^2+14x+15$, the x-axis and the ordinates at $x=-1$ and $x=2$ (3marks)

QUESTION THREE (20MARKS)

a) Integrate the following

i. $\int x^6 dx$ (2marks)

ii. $\int (5x+4)dx$ (2marks)

iii. $\int 2 dx$ (2marks)

iv. $\int 6/x dx$ (2marks)

b) Find the max and min values of

$y=x^3-6x^2+9x+2$ (5marks)

c) Find the equation of the tangent and normal to the curve

$y=x^3-2x^2+3x-1$ at the point (2,5) (4marks)

d) A rectangular storage container with an open top has a volume of 10m^3 and the rectangular base is twice its width. Material of the base cost is 10ksh per sq.metres and the material of the side cost 6 ksh per metre.

Express the cost of the material as a function of the width of the base (3marks)

QUESTION FOUR (20MARKS)

a) Find the following integrals:

i) $\int (2x^2 + 2x - 1) dx$ (2mks)

ii) $\int_0^4 (2x + 1) dx$ (2 marks)

b) Find the derivatives of the following functions using the first principal technique .

i) $y = \frac{1}{x^2}$

ii) $y = 5x + 3$ (8 marks)

c) Find the tangent and normal equation to the curve $x^2 - y^2 = 7$ (4mrks)
at a point (4,3).

d) Find the area enclosed by $y = 5 + 4x - x^2$, the x-axis and the ordinates 1 and $x = 4$ (4marks)

QUESTION FIVE (20MARKS)

a) The total area of the surface of a solid cylinder is 132cm^2 . If the height of the cylinder is h cm and its radius is r cm, show that $h = \frac{21}{r} - r$. Hence find the volume of the cylinder.

(5marks)

b) A curve passes through $(2,3)$ and its gradient function is $3x-d$. Find its equation (2marks)

c) State the ϵ - δ definition of a limit L of a function $f(x)$ as x tends to a point $x=a$ and use it to prove that $\lim_{x \rightarrow 2} (3x+1) = 7$ (5marks)

d) A ball was thrown upwards with a velocity of 40m/s . Find

i) acceleration and velocity statements

ii) maximum it can attain

(6marks)