

UNIVERSITY OF NAIROBI

UNIVERSITY EXAMINATIONS 2014/2015

FIRST YEAR CAT EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE

CSC 114 DIFFERENTIAL AND INTEGRAL CALCULUS

DATE: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_TIME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Answer Question one and any other two Questions**

**Question I (30 marks)**

(a) Find dy/dt of y = y’ =  [5] (b) Find dy/dx of y =  [5]

( c) Find dy/dx of ; [5] ( d ) Evaluate  [5]

(e ) Find the area of the region bounded by  [5]

( f ) Sketch the region R bounded by the graphs of the given equations and find the volume of the solid generated by revolving R about the y axis:[5]

**Question II (10 marks)**

1. Find dy/dx of [3] ( b ) Find dy/dx of **** [3]

(c ) Given f(x) = find x values corresponding to all local extrema, points of inflections; and find regions of concavity; and where f increases/decreases; Sketch the graph of f.[4]

**Question III (10 marks)**

(a) Find dy/dx of .[3]; (b)  [3];

(c) Find the area of the region bounded by  [4]

**Question IV (10 marks)**

1. ( a ) Find ; [3] **(b)**. [3]

. **(c)** Find the area of the region bounded by [4]

**Question V (10 marks).**

(a) A window has the shape of a rectangle surmounted by an equilateral triangle. If the

perimeter of the window is 15 ft, find the dimensions that will allow the maximum

amount of light to enter. [5]

( b ) Sketch the region R bounded by the graphs of the given equations and find the volume of the solid generated by revolving R about the x axis: [5]

1.=



2.



3.



(b)  = [5]

(c ) Given; [5].

(d )==0.106103[5]

(e) The area is bounded by Sol:

= 1.125[5].

(f) Given; ;

+C[5]

**Question II (20 marks)**

1. E+C[5]
2. =[5]
3. =[5]

**Question III (20 marks)**

(a)[4].

(b) [4].

12]

**Question IV (20 marks)**

(a) ; [6]

**(b) **.

[6]

**(c)** The areaof the region bounded by  = [8]

**Question V (20 marks) .**

( c ) Sketch the region R bounded by the graphs of the given equations and find the volume of the solid generated by revolving R about the indicated axis: 

[7]

(a) Determine ;[6] (b) Find dy/dxof[6].

(c) [6] (e) Find the area of the region bounded by [6]

**Question II (20 marks)**

(b) Determine ; [5] (c ). [5

**Question III (20 marks)**

(a) Find dy/dx of[8**Question IV (20 marks)**

(a) Find dy/dxof****[6] **(b)** . [6] **(c)** Find the area of the region bounded by [8]

**Question V (20 marks) .**

(a) Given f(x) =  find x values corresponding to all local extrema, points of inflections; and find regions of concavity; and where f increases/decreases; then sketch the graph of f. [10]

(b) Sketch the region R bounded by the graphs of the given equations and find the volume of the solid generated by revolving R about the indicated axis: [10]

(a) Determine ;[6](b) Find dy/dxof[6].

(c)[6

(e) Find the area of the region bounded by [6]

**Question II (20 marks)**

(b) Determine ; [5](c ). [5

**Question III (20 marks)**

(a)Find dy/dx of[(a) Find dy/dxof****[6] **(b)**. [6]**(c)** Find the area of the region bounded by [8]

**Question V (20 marks).**

(a) Given f(x) =  find x values corresponding to all local extrema, points of inflections; and find regions of concavity; and where f increases/decreases; then sketch the graph of f. [10]

(b) Sketch the region R bounded by the graphs of the given equations and find the volume of the solid generated by revolving R about the indicated axis: [10]

(a) Determine;[5](b) Find dy/dtof[5]

(c) [5](d)

(e) Find the area of the region bounded by ; [5

**Question II (20 marks)**

b) Determine [5](c )[5

**Question III (20 marks)**

(a) Find dy/dx of f(x) = ; [8]

**Question IV (20 marks)**

(a) Find dy/dx of f(x) = [6](b) [6]

(c) Sketch the region R bounded by the graphs of the given equations and find the volume of the solid generated by revolving R about the indicated axis:[8]

**Question V (20 marks)**

(a) Given f(x) = find x values corresponding to all local extrema, points of inflections; and find regions of concavity; and where f increases/decreases; Sketch the graph of f.[10]

(b) Find the area of the region bounded by [10]

(a) Find ; [5](b ) Evaluate[5]

(c) Evaluate: [5 (e

**Question II (20 marks)**

(a) Find[4]**Question III (20 marks)**

(a) Find dy/dtof.[6](b) Evaluate[6](c) Find the area of the region bounded by [8]

**Question IV (20 marks)**

(a) Find dy/dxof;[6](b)[6]

(c) Sketch the region R bounded by the graphs of the given equations and find the volume of the solid generated by revolving R about the indicated axis:[8]

**Question V (20 marks) .**

(a)Find dy/dtof[6] (b) [8]

(c ) Given f(x) = find x values corresponding to all local extrema, points of inflections; and find regions of concavity; and where f increases/decreases; Sketch the graph of f.[6]

**Vertical, Horizontal and ObliqueAssymptotes:**





Sketch the graphs of f and determine the asymptotes for 

1. (a) ; **[4]**

(b) ;**[4]**

(c) ; **[4]**

2. (a) Given f(x) = ;

f’(x) = 

Ans**[5]**

(b) ; y’ = Ans**[5]**

3. Ans**[5]**

Ans**[5]**

f’(x) =; hence

satisfies the Hypotheses of **Mean Value theorem.** Ans**[10]**

5. Given f(x) = 

At x = -2/3 f is max; at x = 1; f is min.

Pi is at x = 1/6; hence incr. on (; fdecr. on

f is CD on and is CU on Ans**[8]**Sketch the graph of f.

6. 

Q E D **[10]**

7. 

5 = A + B; -2 = -2A + C – B +3B = -2(5-B) +C+2B = -10 +4B + C

8 = 4B + C; -19 = 5 – B -3B + 3C ; -24 = -4B +3C = -4B +24 – 12B

-48 = -16B. B = 3; A = 2; C = -4

.

= Ans**[10]**

Ans**[10]**

9. Ans**[10]**

10. 

Ans**[10]**