ID Number: ..... Signature: ..... Room Number: .....Date: .....

UNIVERSITY OF GHANA
FACULTY OF ENGINEERING SCIENCES

Second SEMESTER EXAMINATIONS, 2014/2015

LEVEL 100: BACHELOR OF SCIENCE IN ENGINEERING

FAEN 102: CALCULUS 1

TIME ALLOWED: THREE (3) HOURS

Instructions:

1. **Answer (showing the working) <u>All questions in the space provided on the Question paper</u>**
2. **Calculators allowed**
3. **Graph paper provided below.**

1.

2. (a) F(x) = $\frac{(x^2-1)(x+1)}{x-1}$ for x≠ 1 find the limit of F(x) as x approaches 1^- and 1^+ using the table of values below

x	0.75	0.9	0.99	0.999	1	1.0001	1.001	1.01	1.1	1.25
F(x)										

Sketch the graph of the function and find the point where the graph cuts the x axis.

(b) Find the following limit: $\lim_{x\to -1} \frac{|x+1|}{x+1}$ .....

(c) Study and sketch the graph of the function f(x) = $\frac{x^2+x-6}{(x-2)(x-3)}$

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3. Find the equation of the normal to the curve f(x)= $(x^2+x+1)(x-2)$ at the point where it cuts the x –axis. Sketch the graph below and label it as f(x) .

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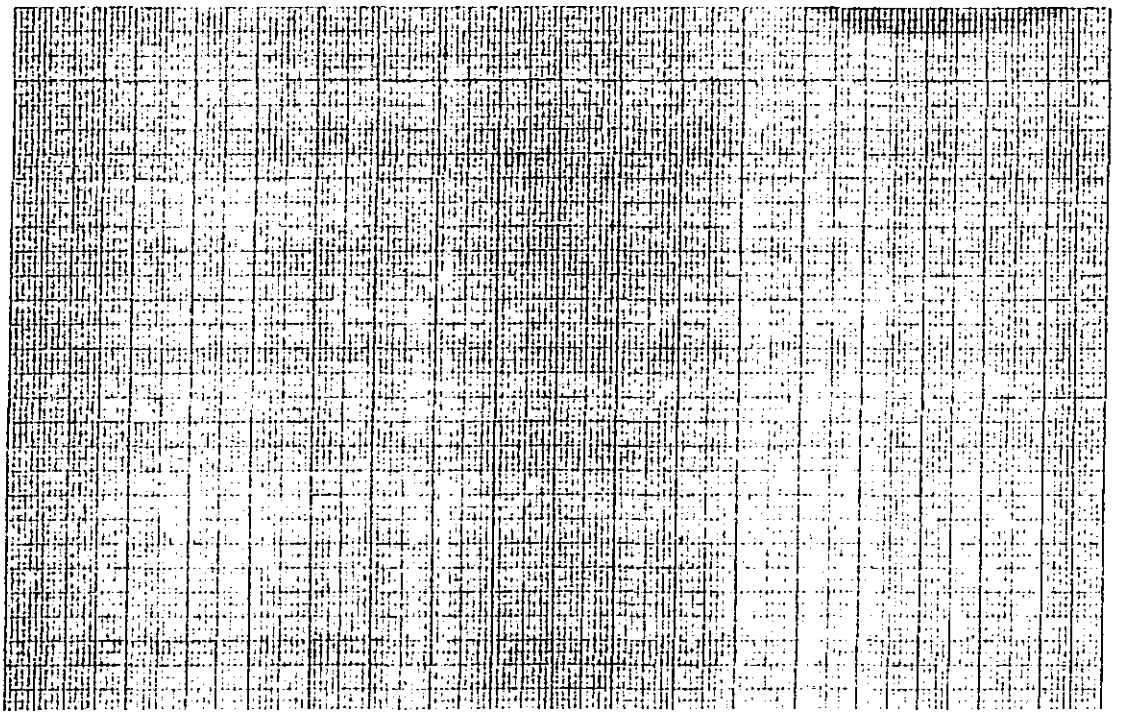

4. K(x)= $x^3e^x - 1$ is given. Sketch it above and label it as K(x) and find the x-intercept to **6 d.p** for 0<x<1 using the method of Newton- Raphson: state the theorem:

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a. X_1=0.9 x_2=..... x_3=..... x_4=..... X_5=.....

x_6=.....x_7=.....x_8=..... X_9=.....

Determine the area to **6 d.p** between the graph and the limits of x: 0-1 for n=8 using:

i. the trapezoidal method: state the theorem: .....

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j. the Simpson's method :state the rule :.....

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k. the direct integration $\int_0^1 (x^3 e^x - 1) dx$

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5. Find the derivative of the following

a. using the limit process:

F(x) = $5x^{14}$

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b. using various theorems

1. F(x) = $\sin^4 x$

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2. F(x) = $X^{x+1} e^{x^2+x+2}(x^3 + cosx)$

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3. F(x) = 5x + cos 2x+e^{2x}

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4. F(x) = tan $2\frac{\pi}{3}$ +cos ex

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6. Find the integral of the following

a. $\int x^3 \sin x \, dx$

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b. $\int \frac{x}{x^2+2x-8}\,dx$

c. $\int \sin 3x\,dx$

d. $\int \sin^7 x\,dx$