Benha University Faculty of Engineering- Shoubra Eng. Mathematics & Physics Department preparatory Year		Final Term Exam Date: 16 – 1 – 2013 Course: Mathematics 1 – A Diff. & Integral Calculus Duration: **3** hours

• Answer all the following questions • The Exam Consists of One page	• No. of questions: 5 • Total Mark: 100 Marks

Marks 100

[1] Find **y`** from the following: 18

(a) $y = 3x^3 + 3^{\sin x}$ (b) $y = \cos x^2 \,.\cosh 2x$ (c) $y = \tan x^3 \,.\log(x + \ln x)$

(d) $y = \tan^{-1}x^2 + \sin^{-2}x$ (e) $y = x^3 + x^y$ (f) $y = t\sec t,\ x = t\sinh^{-1} t$

[2](a)Find the following limits:

(i) $\lim_{x\to 0} \dfrac{\sin^5 x}{x^6 + \tan^5 x}$ (ii) $\lim_{x\to 0} \dfrac{\log(1+2x)}{3^x - 4^x}$ (iii) $\lim_{x\to\infty} \dfrac{x + 2^x}{x - 3^x}$ 6

(b)Write the Maclurin's series of the functions: $f(x) = \dfrac{2}{1-2x^2}$, $g(x) = 2x + e^{3x}$ 8

(c)State the mean value theorem and verify it for the function: $f(x) = \dfrac{1}{x-1}$ in [2, 3]. 4

[3]Sketch the curve of each function: (a) $f(x) = \dfrac{1}{3+x^2}$ (b) $g(x) = 2^x + 2^{-x}$ 14

[4] Find the integrals: (a) $\int \dfrac{(1+\tan x)^5}{1+\cos 2x}\,dx$ (b) $\int x^3 \ln x\,dx$ (c) $\int \dfrac{dx}{5+4\cos x}$ 20

(d)Find the area inside the circle $r = \cos\theta$ and outside the cardioid $r = 1 - \cos\theta$

[5] Evaluate the integrals: (a) $\int cos^4 x\,dx$ (b) $\int sin^5 x\,dx$ (c) $\int \dfrac{x^2}{(4-x^2)^{5/2}}\,dx$ 20

(d)Find the area of the surface of revaluation generated by revolving about x-axis the hypocycloid $x = a\cos^3\theta,\ y = a\sin^3\theta$

[6] Integrate: (a) $\int_1^4 \ln(x+1)\,dx$ (b) $\int \dfrac{1}{x+x^3}\,dx$ 10

(c)Find the volume generated by revolving about y-axis the area between x-axis and the first arc of the cycloid $x = t - \sin t,\ y = t - \cos t$

Good Luck *Dr. Mohamed Eid* *Dr. Fathi Abdsallam*

Mid-Term Exam **Math 1-A** **Time 1 Hour** **Total Mark: 15**

Group	Section	No.	الإسم:

[1]Find the following limits:

$(a)\ \lim_{x\to 1} \dfrac{x^5-1}{\sqrt[5]{x}-1}$

$(b)\ \lim_{x\to 0} \dfrac{sin^2 x}{x^3+x^2}$

$(c)\ \lim_{x\to 0} \dfrac{\ln(1+x)}{3^x-1}$

$(d)\ \lim_{x\to \infty} \dfrac{2+x^2}{x^2+3}$

[2] Find y` where

(a) $y = x^3.3^x + \log(2x + \sec x)$

(b) $y = \cosh x^2 + (\sin 2x + \sinh 3x)^5$

(c) $y = 3 + \dfrac{\cos x}{\tan x + \ln x}$

(d) $y = \sin^{-1}t^2 + \sin^{-2}t\,, \quad x = \tan^{-1} t + \tanh^{-1}t$

(e) $y = e^y + 3^x + \sinh(xy)$