Department of Basic Science **Level: 1** **Examiner: Dr. Mohamed Eid** **Time allowed: 3 hours**	Pyramids higher Institute P.H.I. For Engineering And Technology معهد الأهرامات العالى للهندسة و التكنولوجيا	**Prep. Year: Final Exam** **Course: Mathematics 2** **Course Code: BAS 013 B** **Date: May 21, 2015**

The Exam consists of one page **Answer all questions** **No. of questions: 5** **Total Mark:** 70

Question 1

Find **y`** from the following: 18

(a) $y = 2x^4 + 3\sinh x$ (b) $y = 3^x.\cosh x^2$ (c) $y = \ln \frac{\ln x.\sqrt{1+2^x}}{\text{sech } x.\sqrt[3]{2+\sec x}}$

(d) $y = \sin^{-1} x + \tanh^{-2}x$ (e) $y = t.\ln t,\ x = t.e^t$ (f) $y = x^2 + \tan^{-1}(xy)$

Question 2

Find the following integrals: 18

(a) $\int (2x^3 + 3^x + 3)dx$ (b) $\int (\frac{1}{1+x^2} + \frac{1}{\sqrt{1+x^2}})dx$ (c) $\int e^x \cosh x\, dx$

(d) $\int \frac{1}{1+2^{-x}} dx$ (e) $\int (\frac{1}{x} + \sqrt{x})^2\, dx$ (f) $\int x^2.\ln x\, dx$

Question 3

(a) Prove that: $\sinh^{-1} x = \ln[x + \sqrt{1+x^2}]$. 4

(b)Find the integrals: (i) $\int \cos^5 x\, dx$ (ii) $\int \frac{2x+1}{x^2-6x+5} dx$ 6

Question 4

(a)Find the area of the region between the curve $y = x^2 - 2x$, x-axis, x in [0, 3]. 3

(b)If the region between the curve $y = \frac{1}{2+x}$, x-axis, x in [– 1, 0] is rotated about

(i) x-axis (ii)y-axis. Find the volume of the generated solids V_x, V_y. 6

(c)Find the length of the curve $y = \frac{x^3}{12} + \frac{1}{x}$, x in [1, 2]. 3

Question 5

(a)State the definition of the plane. 2

(b)Find the angle between the plane $2x - y + z + 7 = 0$ and the line $\frac{x}{1} = \frac{y}{-2} = \frac{z+1}{2}$. 4

Also, find the point of intersection.

(c)Write the equation of the plane that passes through the points:

(2, 1, 0), (– 1, 1, 2), (3, 0, 1). 3

(d)Write the name of each surface:

(i) $x^2 + y^2 + z^2 - 3 = 0$ (ii) $y^2 = x^2 + z^2$ (iii) $x^2 + y^2 = 4$ (iv) $y^2 + z^2 = 3$ 3

Good Luck *Dr. Mohamed Eid*

ID:	الاسم:

Math. II	Mid-Term Exam	March 28, 2015	Time: 1 Hour

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

(a) $y = 2x^4 + 3\sin^{-1} x$ y`=

(b) $y = 3^x + \operatorname{sech} x$ y`=

(c) $y = \ln(x + \cosh x)$ y`=

(d) $y = \tanh^{-1} x \,.\, \tan^{-1}\mathrm{x}$ y`=

(e) $y = 4^{\tanh\, x}.\sinh \ln x$ y`=

(f) $\mathrm{y} = 2^{\mathrm{y}} + \mathrm{x}^{\mathrm{x}}$ y`=

[2]Find the integrals:

(a) $\int (3x^3 + 3^x)dx =$

(b) $\int (\frac{2x}{1+x^2} + \frac{2x}{\sqrt{1+x^2}})dx =$

[3]Find the integrals: (a) $\int \ln(1+x)\,dx$ (b) $\int \frac{x}{x^2-3x-4}\,dx$

[4]Prove that: $\tanh^{-1}\mathrm{x} = \frac{1}{2}\ln\frac{1+\mathrm{x}}{1-\mathrm{x}}$

Math II i	Sec:	ID:	الإسم:

Find y` where:

(1) $y = 3x^3 + 2\cos x$ y`=

(2) $y = 3^x + \tanh x^3$ y`=

(3) $y = \tan^{-1}x + (\operatorname{sech} x)^3$ y`=

(4) $y = \sin^{-1} x \,.\ln x$ y`=

(5) $y = 2^{\sin x} + \log(x^3 + 2)$ y`=

(6) $y = 3 - \cosh \ln x$ y`=

(7) $y = (\sinh x + 2\cosh x)^4$ y`=

(8) $y = t.\sinh t\,,\ x = t + \ln t$ y`=

(9) $y = e^{xy} + 2x$ y`=

Math II ii	Sec:	ID:	الإسم:

Find y` where:

(1) $y = 2x^{-2} + 3\sin x$ y`=

(2) $y = 2^{x} + \tan x^{3}$ y`=

(3) $y = \tanh^{-1}x + (\tanh x)^{-1}$ y`=

(4) $y = x.\sinh^{-1} x$ y`=

(5) $y = 3^{\cos x} + \log\cosh x$ y`=

(6) $y = 2x - \sinh\ln x$ y`=

(7) $y = (\tanh 3x + 2\cosh x)^{5}$ y`=

(8) $y = t.\cosh t\ ,\ x = t - \log t$ y`=

(9) $y^{5} + x + \sin(xy) = 2$ y`=

Math II iii	Sec:	ID:	الإسم:

Find y` where:

(1) $y = \frac{1}{3}x^4 - 3\tan x$ y`=

(2) $y = 2^{x^3} + \cos 2x$ y`=

(3) $y = \tan^{-1}3x + (\tanh x)^{-1}$ y`=

(4) $y = \log(3x + \sin 2x)$ y`=

(5) $y = \sinh^3 x + \tanh x^3$ y`=

(6) $y = 3 + x^x$ y`=

(7) $y = \frac{1}{(3\tanh\ x - \cosh\ 2x)^8}$ y`=

(8) $y = t + \operatorname{sech} t\ ,\ x = t.\sinh t$ y`=

(9) $y^3 = x + \cosh(xy)$ y`=

Math II iv	Sec:	ID:	الإسم:

Find y` where:

(1) $y = \frac{3}{4}x^{-4} + \tanh x$ y`=

(2) $y = e^{\sqrt{x}} + \cosh 2x$ y`=

(3) $y = \sin^{-2}x + (\sinh x)^{-1}$ y`=

(4) $y = \tanh^{-1} x \,.\ln x$ y`=

(5) $y = x - 3\cosh\sqrt{x}$ y`=

(6) $y = 4 + x\sinh x$ y`=

(7) $y = \ln^4(x+1) + \ln(x+1)^4$ y`=

(8) $y = t.\operatorname{sech} t\,,\ x = t.\log t$ y`=

(9) $y = x^2 + \cosh(x+y)$ y`=