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 , 2017**

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

Question 1

Find $\mathbf{y`}$ from the following: 18

(a) $y = \sin^{-1} x + \tanh^{-1} x$ (b) $y = 3^x . \cosh x$ (c) $y = \log x . \sinh x$

(d) $y = \sinh^{-1} x - \cosh^{-1} x$ (e) $y^3 = x^x + e^y$ (f) $y = t + \ln t$, $x = t.e^t$

Question 2

(a)Prove that : $\tanh^{-1} x = \ln \sqrt{\frac{1+x}{1-x}}$. 5

(b)Prove that : If $I_n = \int \tan^n x \, dx$, then $I_n = \frac{1}{n-1} \tan^{n-1} x - I_{n-2}$. 5

Question 3

Find the following integrals: 18

(i) $\int (4^x + x^4 + \frac{4}{x}) dx$ (ii) $\int (\frac{x}{1+x^2} - \frac{2}{1+x^2}) dx$ (iii) $\int (3^x - 2^x)^2 \, dx$

(iv) $\int (x + \sinh x) dx$ (v) $\int (\cos x - \cosh x) \, dx$ (vi) $\int \frac{x}{x^2 - 5x - 6} dx$

(vii) $\int x . \sin x \, dx$ (viii) $\int \tanh^{-1} x \, dx$ (ix) $\int tan^4 x \, dx$

Question 4

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

(b)Find the arc length of the curve : $y = x^3$ between the points (1, 1), (2, 8). 3

(c)If the region between the curve $y = \ln x$, y-axis, y in [1, 2] is rotated about

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

Question 5

(a)State the definition of the plane. 2

(b)State the definition of the sphere. 2

(c)Find the angle between the planes : $x - 2y - 2z + 1 = 0$, $3y + 4z - 5 = 0$. 2

(d)Write the equation of the sphere with center (1, –2, 4) and radius is 3. 2

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

(2, 1, – 1), (1, 2, 3), (3, 4, 1). 4

Good Luck *Dr. Mohamed Eid*