Ministry Of Higher Education **Higher Institute of Engineering** **October 6 City** **Department of Basic Science**	مدينة الثقافة و العلوم	**Prep. Year: Final Exam** **Mathematics: (Calculus I)** **Course Code: BAS 111** **Date: September, 2014**

الزمن: 3 ساعات — **الامتحان (5) أسئلة في صفحة واحدة و المطلوب الإجابة عن كل الأسئلة** — Marks

[1]Find $\mathbf{y`}$ from the following: 12

(a) $y = 2x^3 + \cos x$ (b) $y = 4^x + 3\sin x$ (c) $y = \cos x + \ln x$

(d) $y = 3x + 2\sinh x$ (e) $y = 5 + 3\cosh x$ (f) $y = (\tan x + \log x)^9$

[2]Find $\mathbf{y`}$ where 12

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

(d) $y = 3^y + 2x + \sin x$ (e) $y = t^2 + \sin t\,,\quad x = t^3 + \sinh t$

[3](a) Determine the maximum, minimum and inflection points of the functions: 9

(i) $f(x) = x^3 - 12x + 1$ (ii) $f(x) = x^3 + 2$ (iii) $f(x) = x + \frac{1}{x}$

(b)Write the Maclurin's expansion of the function $f(x) = 1 + 2^x$ 3

[4]Find the following integrals: 12

(a) $\int (3x^2 + 4^x)dx$ (b) $\int (\frac{1}{x} + \frac{1}{x^2})dx$ (c) $\int 2x(x^2 - 3)^8\, dx$

(d) $\int x.3^x\, dx$ (e) $\int \ln x\, dx$ (f) $\int (\sin x + \sin^2 x)\, dx$

[5](a)Compute the integral $\int_0^1 \frac{x}{x^2+4x+3} dx$ 4

(b)Find the area of the region between the curve $y = x^2 - 2x$, x- axis, x in [0, 2] 4

(c)If the region between the curve $y = 1 + x^2$, x-axis, x in [0, 1] is rotated 4

about (i) x-axis (ii)y-axis.

Find the volume of the generated solid in both cases.

Good Luck *Dr. Mohamed Eid*