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: 9 / 1 / 2012**

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

[1]Find **y`** from the following: 12

(a) $y = 2x^3 + \sqrt{x} + \sin x$ (b) $y = 3^x.\tan x + \log x$ (c) $y = x\cos x^3 + \ln(x^2+1)$

(d) $y = \tan^{-1}x + (x^2+3x)^8$ (e) $y = \dfrac{\sin x}{x + \sinh x}$ (f) $y = (\sin x)^3 + (\cos x)^x$

[2](a)Write the membership table of the statement: $S = (B`-C)\cup(A\cap B)$ 3

(b)Evaluate the limits: (i) $\lim\limits_{x\to 0}\dfrac{x-\sin x}{2^x+x-1}$ (ii) $\lim\limits_{x\to 0}\dfrac{x+\tan x}{\ln(1+2x)}$ 4

(c) Sketch the curve of the function $f(x) = \dfrac{2}{x} + \dfrac{x}{2}$ 7

[3](a) Find y` where: $y = t^2 + 2^t + 3,\quad x = \sinh t^2 + 3\cosh t$ 2

(b) Find y` from the equation: $y = x^2 + \sin x^3 + \cos y$ 2

(c) Sketch the curve of the function $f(x) = x^3 - 9x$ 6

[4]Find the following integrals: 12

(a) $\int(x^2 + \sqrt{x} + \cos x)\,dx$ (b) $\int\left(\dfrac{2x}{x^2+3} + \dfrac{2x}{\sqrt{x^2+3}}\right)dx$ (c) $\int(3^x + 2x.3^{x^2})dx$

(d) $\int\dfrac{x-6}{x^2-3x}\,dx$ (e) $\int x.\ln(x+2)dx$ (f) $\int\cos^4 x\,dx$

[5](a)Using trapezoidal rule, compute the integral $\int_1^2\sqrt{x+\ln x}\,dx,\ \Delta = 0.1$ 3

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

(c)If the region between the curve $y = 1+\sqrt{x}$, x-axis, $x\in[0,\ 1]$ is rotated about (i) x-axis (ii)y-axis. Find the volume of the generated solid in both cases 6

Good Luck *Dr. Mohamed Eid*