Arab Academy for Science, Technology & Maritime Transport

$College \ of \ Engineering \ \& Technology \\$

Final Examination Paper

Department	Basic & Applied Science	Date	04/01/2014
Lecturer	Course coordinator : Dr. Allam Abdelaziz	Marks	40
Course Title	Mathematics 1	Time Allowed	2 hours
Course Code	BA123	Start Time	09:00-11:00



Q1: Find
$$\frac{dy}{dx}$$
 for $y = x^3 \cos x^2 - 2 \cot x^{-3}$.

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.

Marks

Q2: Find
$$\frac{dy}{dx}$$
 for

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$$\frac{dy}{dx}$$
 for $y = \left(\frac{x^x \cosh^{-1}x}{\left(1 - x^2\right)^3 \csc^2 x}\right)^4$.

MPC6/1-1

Q3: Find $\frac{dy}{dx}$ for $sin(xy) - y^3 = 0$. 3 <u>Marks</u> $\lim_{\varphi \to 0} (\cos \varphi \cot \varphi)$ **Q4:** Evaluate the following limit <u>Marks</u>

Q5:	Evaluate the following limit	$\lim_{x\to\infty}\left(\frac{x}{x+1}\right)^x.$	4 <u>Marks</u>

Q6: If $x = e^t$ and $y = e^{4t}$, Show that $y'' = 12 x^2$. <u>Marks</u> **Q7:** Using Maclaurin's expansion, Show that

$$e^{-x} \sin(2x) = 2 x - 2 x^2 - \frac{1}{3} x^3 + x^4 + \cdots$$

4 <u>Marks</u>

Math I MPC6/1-1

Q8: If
$$z = ln(x^2 + y^2)$$
, show that $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial y^2} = 0$.

5 <u>Marks</u>

MPC6/1-1

Q9:	Discuss and sketch the curve	$x^2 + 2 x - 4 y - 3 = 0 .$	
			5 <u>Marks</u>

Q10: For the curve

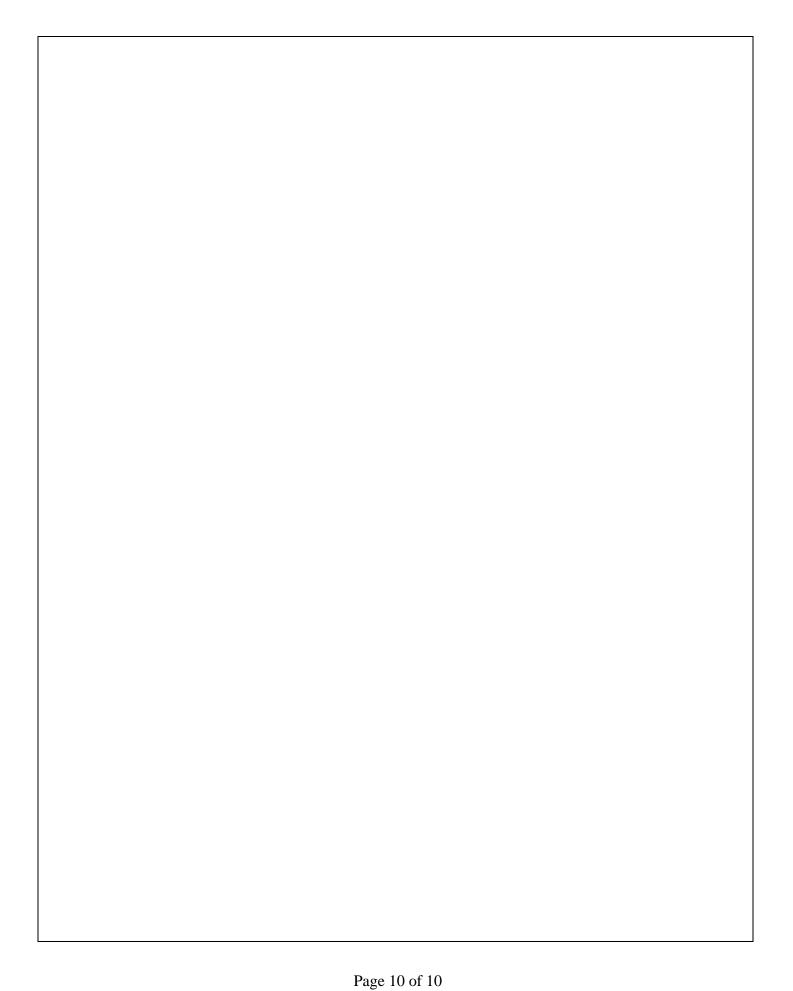
 $y = x^3 - 6x^2 + 10$

(a) Find the critical points.

6 <u>Marks</u>

- (b) Find the intervals in which the curve is increasing and decreasing.
- (c) Find the local maximum and minimum points.
- (d) Find the inflection point.
- (e) Find the concavity of the curve.
- (f) Sketch the curve.

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