



Final Examination Paper

Department	Basic & Applied Science	Date	01/06/2013
Lecturer	Mathematics Group	Marks	40
Course Title	Mathematics 1	Time Allowed	2 hours
Course Code	BA123	Start Time	09:00-11:00

اسم الطالب باللغة العربية :

اسم المحاضر :

Student's Name

Reg. No. (رقم التسجيل)	Department (القسم)
---------------------------	-------	-----------------------	-------

Question #	Marks	
	Maximum Score	Student Score
1	2	
2	3	
3	2	
4	3	
5	2	
6	3	
7	4	
8	5	
9	6	
10	5	
11	5	
Total	40	

	Lecture Name :
	Signature :
	Date :

Members of Course Examination Committee:	Signature	Date
Prof. Nasser M. El-Maghraby		
Dr. Dr. Mohamed Abdel Hamid		
Dr. Khaled Ramadan		

Find $\frac{d y}{d x}$ for each of the following functions (From Q1 to Q3):

Q1 : $3x^4 y^2 + 2x^6 - \tan 3y = 9$

2

Marks

A1, B2

Q2 : $y = \ln \left(\frac{(2x-3)^4 (4-\sec x)^3}{x^x (1-\sin x)^2} \right)^5$

3

Marks

A5, B2

Q3: $y = x^3 \tan^{-1} \sqrt{x} + e^{\cosh^{-1} x}$

2
Marks

A1, B2

Q4: If $x = \frac{t-1}{t+1}$ and $y = \left(\frac{t+1}{t-1}\right)^4$,

Show that $\frac{d^2y}{dx^2} = \frac{20}{x^6}$.

3
Marks

A1, A5, B2

Evaluate the following limits (From Q5 to Q6):

Q5 : $\lim_{x \rightarrow 0} \frac{1 - \cosh x}{x^2}$

2 <u>Marks</u>
A5, B2

Q6 : $\lim_{x \rightarrow 0} (1 + \sin 5x)^{1/x}$

3 <u>Marks</u>
A1, A5, B2

Q7 : **Using Maclaurin's expansion, Show that**

$$\frac{e^{-x}}{1-x} = 1 + \frac{x^2}{2} + \frac{x^3}{3} + \dots$$

4

Marks

A1, A5, B2

Q8 : **If** $z = \tan^{-1}\left(\frac{x}{y}\right)$, **show that** $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial y^2} = 0$.

5
Marks

A5, B2

Q9 : For the curve $y = x^3 - 9x^2 + 8$, find

- (a) The critical points.
- (b) The intervals in which the curve is increasing and decreasing.
- (c) The local maximum and minimum points.
- (d) The inflection point.
- (e) The concavity of the curve.
- (f) Finally, sketch the curve.

6

Marks

A1, B2

Q10 : For the following function

$$y = \frac{x}{x+3}$$

(a) Find the domain.

(b) Find the vertical asymptote(s).

(c) Find the horizontal asymptote(s).

(d) Discuss the symmetry of the function.

(e) Find the x - and y - intercept(s), if there exist.

5
Marks

A1, B2

Q11 : Discuss and sketch the curve $y^2 - 4y - 4x + 12 = 0$.

5
Marks

A1, B2