

Arab Academy for Science, Technology  
& Maritime Transport

College of Engineering & Technology



*Final Examination Paper*

**Department:** Basic & Applied Science

**Date :** 13/8/2007

**Lecturer :** Dr. Hossam Shawky

**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	3	
2	2	
3	2	
4	3	
5	2	
6	3	
7	5	
8	5	
9	5	
10	5	
11	5	
<b>Total</b>	<b>40</b>	
<b>Lecturer</b>	<b>Name :</b>	
	<b>Signature :</b>	
	<b>Date :</b>	

Find  $\frac{dy}{dx}$  for each of the following functions (From Q1 to Q3)

Marks

$$\text{Q1. } y = 4 \sqrt[4]{\frac{(1-x)^3 \tan^{-1} x}{x^x \sec x^3}}$$

3

$$\text{Q2. } y = \tan^4(\cosh x^2) + \sqrt{e^{\sin^{-1} x}}$$

2

Q3.  $x y^4 + 3 \cos(xy) = e^y + x^3$

Marks

3

Q4. If  $x = \cos \theta + \theta \sin \theta$  and  $y = \sin \theta - \theta \cos \theta$ , find  $\frac{d^2 y}{d x^2}$

2

**Evaluate the following limits (From Q5 to Q6)**

Q5.  $\lim_{x \rightarrow 0} \frac{x \cos x + \tan 2x}{x \sec x + \sin 4x}$

**Marks**

2

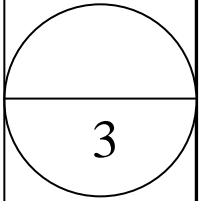
Q6.  $\lim_{x \rightarrow \pi/2} [\sec x - \tan x]$

3

Q7. Find the  $n^{\text{th}}$  derivative for  $y = \ln|ax + b|$

and hence find the  $n^{\text{th}}$  derivative for  $y = \ln|3 - 4x|$ .

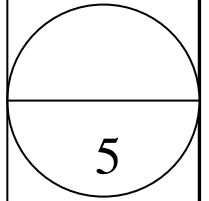
Marks



Q8. Using Maclaurin's expansion, show that

$$e^{-x} \cos x = 1 - x + \frac{x^3}{3} - \frac{x^4}{6} + \dots$$

**Marks**



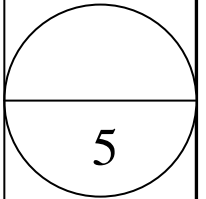
Q9. If  $Z = e^{(x^2 - y^2)}$ , show that  $\frac{\partial^2 Z}{\partial x^2} + \frac{\partial^2 Z}{\partial y^2} = 4(x^2 + y^2)Z$

**Marks**

5

Q10. Simplify  $\frac{(1-i)^8}{(1+\sqrt{3}i)^6}$ .

**Marks**





Q11. Discuss and sketch the curve  $y^2 - 4y + 8x + 36 = 0$

**Marks**

5