


Engineering Mathematics and Physics Department Mathematics 1 Code: Math 101 Time Allowed: <b>2 hours</b>	 <b>Modern University</b> For Technology & Information	Academic year: 2011 / 2012 Semester: Autumn Final Exam: 22 / 1 / 2012 Examiners: Dr. Mona Samir Dr. Mohamed Eid
<b>Answer All Questions</b>	<b>Faculty of Engineering</b>	<b>Marks</b>
<b>Question 1</b>		
Find $y'$ from the following:		10
(a) $y = 2x^3 + 4^x - 3$	(b) $y = \sqrt{x} + \frac{1}{x^3} + 2x$	(c) $y = [x + \cos 3x]^4$
(d) $y = \log x \cdot \sin x + \tan x^3$	(e) $y = \sinh^{-1}x + \sin^{-1}x + [\sin x]^{-1}$	
<b>Question 2</b>		
(a) Find $y'$ where $y = t^3 + \tanh t - \sinh t$ , $x = \tan^{-1}t + \tanh^{-1}t$		2
(b) Find $y'$ from the equation: $y = x + y^2 \sin x + e^y$		3
(c) Determine the maximum, minimum and inflection points of the function: $f(x) = x^3 - 3x^2 - 9x$		5
<b>Question 3</b>		
Find the following integrals:		10
(a) $\int (x^3 - \frac{1}{x^2} + 2) dx$	(b) $\int \cos^5 x dx$	(c) $\int \frac{3}{x^2 - 3x} dx$
(d) $\int (3^x + 2x \cdot 3^{x^2} + \tan x) dx$	(e) $\int (\frac{1}{1+x^2} + \frac{2x}{1+x^2} + \frac{2x}{\sqrt{1+x^2}}) dx$	
<b>Question 4</b>		
(a) Find the integrals: (i) $\int \ln(x+3) dx$ (ii) $\int \cos^3 x \cdot \sin^4 x dx$		2+2
(b) Find the area of the region between the curve $y = 1 - x^2$ , x-axis, x in [0, 2]		2
(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.		2+2

*Good luck*

*Dr. Mona Samir*

*Dr. Mohamed Eid*

(1) Find the limits:

$$(a) \lim_{x \rightarrow 1} \frac{x^5 - 1}{x^3 - 1}$$

$$(b) \lim_{x \rightarrow 0} \frac{2^x - 1}{3x}$$

$$(c) \lim_{x \rightarrow 0} \frac{\log(1+x)}{\sin x}$$

$$(d) \lim_{x \rightarrow \infty} \frac{x^2 + 2x}{x^3 + x + 1}$$

(2) Find  $y'$  where:

$$(a) y = x^3 + 4^x + 5$$

$$(b) y = \sin x \cdot \cosh x + \log x$$

$$(c) y = \frac{\tan x}{x^3 + 1}$$

$$(d) y = \cos x^3 + \ln(2^x + 4)$$

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**Answer**

(1) Find the limits:

$$(a) \lim_{x \rightarrow 1} \frac{x^3 - 1}{x^7 - 1}$$

$$(b) \lim_{x \rightarrow 0} \frac{2x}{3^x - 1}$$

$$(c) \lim_{x \rightarrow 0} \frac{\tan x}{\log(1+x)}$$

$$(d) \lim_{x \rightarrow \infty} \frac{x^3 + x}{x^3 + 4}$$

(2) Find  $y'$  where:

$$(a) y = x^2 \cdot 3^x + \sin x$$


$$(b) y = \sinh x^3 + \log x + 8$$

$$(c) y = 3x + (\tan x + \tanh x)^4$$

$$(d) y = 3\cos x + \ln(2^x + 4)$$

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**Answer**

Engineering Mathematics Department Mathematics 1 Code: Math 101 Mid-Term Exam <b>Time Allowed: 60 Minuets</b>	 <b>Modern University</b> For Technology & Information Faculty of Engineering	Academic year: 2011 / 2012 Semester: Autumn November 2011 Examiners: Dr. Mona Samir Dr. Mohamed Eid
<b>Answer The Four Questions</b>		<b>Marks</b>
[1] Compute the limits:		8
(a) $\lim_{x \rightarrow 1} \frac{\sqrt{x} - 1}{x^3 - 2}$ (b) $\lim_{x \rightarrow 0} \frac{\tan^3 x}{x^3}$ (c) $\lim_{x \rightarrow 1} \frac{2^x - 2x}{x^3 - x}$ (d) $\lim_{x \rightarrow \infty} \frac{3x^2 + 2x}{x^3 + x + 1}$		
[2](a) Discuss the continuity of the function $f(x) = \begin{cases} x^2, & x < 1 \\ \frac{2}{x}, & x \geq 1 \end{cases}$		2
(b) Find the maximum, minimum and inflection points of the function: $f(x) = 2x^3 - 3x^2 + 1$		4
[3] Find $y'$ where:		8
(a) $y = x^3 + 3^x + 2$ (b) $y = \cos x \cdot \cosh x + \log x$ (c) $y = \tan x + y^3 + 2^x$ (d) $y = t - \cos t, \quad x = t^3 + \sinh t$		
[4] Find $f'(x)$ where:		8
(a) $f(x) = \frac{\tanh x}{x^2 + 3}$ (b) $f(x) = \sin x^3 + \ln(2^x + 3x)$ (c) $f(x) = 3x^2 + \sin^{-1}x$ (d) $f(x) = (\tan^{-1}x)^3 + \tan^{-3}x$		

*Good luck*

*Dr. Mona Samir*

*Dr. Mohamed Eid*

Quiz II: \*

Time 35 Minutes

21 /12 / 2011

Find the following integrals:

(1)  $\int (2x^3 + 4^x + 3)dx$

(2)  $\int (3+x^2)^2 dx$

(3)  $\int \left( \frac{1}{x} + \frac{2x}{x^2+3} + \frac{1}{x^3} \right) dx$

(4)  $\int \frac{1}{x^2 - 6x + 9} dx$

(5)  $\int \frac{3x - 2}{x^2 - 3x - 4} dx$

(6)  $\int x \cdot 3^x dx$

(7)  $\int \sin^3 x dx$

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Quiz II: \*\*

Time 35 Minutes

21 /12 / 2011

Find the following integrals:

(1)  $\int (3x^2 + 3\cos x + 1)dx$

(2)  $\int (1+2^x)^2 dx$

(3)  $\int \left( \frac{3}{x} + \frac{2x}{\sqrt{3+x^2}} \right) dx$

(4)  $\int \frac{x}{x^2 - 6x + 9} dx$

(5)  $\int \left( \frac{1}{\sqrt{x}} + 2x \cdot 3^{x^2} \right) dx$

(6)  $\int x \cdot \cos x \, dx$

(7)  $\int (1+2\sin x)^2 \, dx$

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Find the following integrals:

$$(1) \int \left( \frac{2}{x} + \tan x - 3 \right) dx \quad (2) \int \left( x + \frac{1}{x} \right)^2 dx \quad (3) \int \left( \frac{2^x}{3^x} + \frac{\cos x}{3 + \sin x} \right) dx \quad (4) \int \frac{x}{x^2 - 5x + 6} dx$$

$$(5) \int (3x^2 \cdot \sqrt{x^3 + 4} + 3^x) dx \quad (6) \int \arctan x \, dx \quad (7) \int (\sin x + \cos x)^2 \, dx$$

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