

Basic Science Department Mathematics 1 Code: Math 101 Final Exam: 13 / 1 / 2013 Time Allowed: 2 hours	 Modern University For Technology & Information	Academic year: 2012 / 2013 Semester: Autumn Examiners: Dr. Mona Samir Dr. Mohamed Eid
Answer All Questions	Faculty of Engineering	Total Mark: 40

Question 1

Find y' from the following:

- | | | |
|--|---|--|
| (a) $y = 3x^4 + 4x - 4$ | (b) $y = \sin 2x \cdot \log(x + \sinh x)$ | (c) $y = [x^2 + \cosh 2x]^4$ |
| (d) $y = \frac{\sinh^{-1} x}{x + \ln x}$ | (e) $y = x \sin y + \cos x^2$ | (f) $y = t \operatorname{sect}, x = t + \tan^{-2} t$ |

12

Question 2

(a) Determine the maximum and minimum points of the function:

$$f(x) = 2x^3 - 15x^2 + 24x$$

3

(b) Find the integral $\int (\cos 2x)^5 dx$

3

Question 3

Find the following integrals:

12

- | | | |
|--|--|---------------------------------------|
| (a) $\int (3x^2 - \frac{3}{x} + 2^x) dx$ | (b) $\int (2 - 3^x)^2 dx$ | (c) $\int \frac{[1 + \ln x]^8}{x} dx$ |
| (d) $\int (\frac{1+e^x}{x+e^x} + \frac{2}{\sqrt{1-x^2}}) dx$ | (e) $\int \frac{x^2}{\sqrt{1-x^2}} dx$ | (f) $\int \sin^{-1} x dx$ |

Question 4

(a) Compute the integral: $\int_3^4 \frac{x}{x^2 - 3x + 2} dx$

3

(b) Find the area of the region between the curve $y = x^3 - 1$, x-axis, x in $[0, 2]$

3

(c) If the region between the curve $y = x^2 + 1$, x-axis, x in $[0, 1]$, is rotated about: (i) x-axis (ii) y-axis.

4

Compute the volume of the generated solid in both cases.

Good luck

Dr. Mona Samir

Dr. Mohamed Eid

Engineering Mathematics Department Math. 1 Code: Math 101 Mid-Term Exam Time Allowed: 60 Minuets Answer All Questions	 Modern University <i>For Technology & Information</i> Faculty of Engineering	Academic year: 2012 / 2013 Semester: Autumn Date: 11 / 11 / 2012 Examiners: Dr. Mona Samir Dr. Mohamed Eid Total Mark: 30
[1] Find the following limits:		8
(a) $\lim_{x \rightarrow 1} \frac{x^5 - 1}{\sqrt[5]{x} - 1}$ (b) $\lim_{x \rightarrow 0} \frac{\tan^5 x}{x^6 + 4x^5}$ (c) $\lim_{x \rightarrow 0} \frac{x + \tan 2x}{\sin 4x - x}$ (d) $\lim_{x \rightarrow \infty} \frac{\sqrt{x^2 + 3}}{2x + 1}$		
[2](a)Find the maximum and minimum points of: $f(x) = x^3 - 3x^2 - 9x$		4
(b)Find y' from the equation: $x^2y^3 + 2 \sin xy = 6x$		4
[3]Find y' where:		14
(a) $y = 2x^3 + 3^x + 4$	(b) $y = 4^{x^2} + \cos(x^3 + 3)$	
(c) $y = \tan \ln x + \log(x + \sin x)$	(d) $y = \sec x \cdot \sin^{-1} x^2$	
(e) $y = [\tan^{-1} x^3 + \tanh^{-1} x]^5$	(f) $y = \frac{x^3}{\cosh x + \cos x}$	
(g) $y = t + \tan t^3, \quad x = t^2 + \operatorname{sech} t$		

Good luck

Dr. Mona Samir

Dr. Mohamed Eid

Group	ID	الاسم:
-------	----	--------

[1] Find the limits:

$$(a) \lim_{x \rightarrow 1} \frac{x^4 - 1}{x^8 - 1} \quad (b) \lim_{x \rightarrow 0} \frac{x^3}{\sin x} \quad (c) \lim_{x \rightarrow 0} \frac{\ln(1 + x)}{3^x - 1} \quad (d) \lim_{x \rightarrow \infty} \frac{3x^2 - 2}{x^3 + 1}$$

[2] Find y' where

$$(a) y = 2x^3 + 3^x + \log x \quad (b) y = \sin x^2 \cdot \ln(1 + \cos x) \quad (c) y = \frac{\cos x}{x^2 + 3} + (2 + 2^x)^8$$

Answer

Group 5: C, D	ID	الاسم:
---------------	----	--------

[1] Find the limits:

$$(a) \lim_{x \rightarrow -1} \frac{x^6 - 1}{x^7 + 1} \quad (b) \lim_{x \rightarrow 0} \frac{\tan 3x}{\sin x} \quad (c) \lim_{x \rightarrow 0} \frac{x^2}{2^x - 1} \quad (d) \lim_{x \rightarrow 0} \frac{\sin 2x}{\ln(2 + x)}$$

[2] Find y' where

$$(a) y = 3\sqrt{x} + \sin 3x + \ln x \quad (b) y = \tan x^2 \cdot \cosh 3x \quad (c) y = \frac{\sinh x}{\cos x^3}$$

Answer

Group 7: A, B	ID	الاسم:
---------------	----	--------

[1] Find the limits:

$$(a) \lim_{x \rightarrow 1} \frac{\sqrt{x} - 2}{\sqrt{x} + 2} \quad (b) \lim_{x \rightarrow 0} \frac{\tan x^3}{\sin x} \quad (c) \lim_{x \rightarrow 0} \frac{\ln(1+x)}{2^x - 1} \quad (d) \lim_{x \rightarrow \infty} (x^2 - 2x)$$

[2] Find y' where

$$(a) y = x^4 + 4^{x^3} \quad (b) y = \tanh x^2 \cdot \sin 2x \quad (c) y = \frac{\log x}{3+x^3}$$

Answer

Group 4: A	ID	الاسم:
------------	----	--------

[1] Find the limits:

$$(a) \lim_{x \rightarrow 2} \frac{x^5 - 32}{x^6 - 64} \quad (b) \lim_{x \rightarrow \infty} \frac{x^2 + 2}{x^3 - 1} \quad (c) \lim_{x \rightarrow 0} \frac{x^3}{3^x - 1} \quad (d) \lim_{x \rightarrow 0} \frac{\sin x^3}{\ln(1 + x)}$$

[2] Find y' where

$$(a) y = x^4 + \ln \sin 4x \quad (b) y = \sec x^3 \cdot \cosh 3x \quad (c) y = 3 + \sinh^2 x^2$$

Answer

Group 4: B	ID	الاسم:
------------	----	--------

[1] Find the limits:

$$(a) \lim_{x \rightarrow 2} \frac{x^5 - 32}{x^6 - 60} \quad (b) \lim_{x \rightarrow 0} \frac{\tan x^2}{x^3 + x^2} \quad (c) \lim_{x \rightarrow 0} \frac{2^x - 4^x}{3^x - 1} \quad (d) \lim_{x \rightarrow 0} \frac{\ln(1 + x^2)}{x}$$

[2] Find y' where

$$(a) y = 4^x + 3 \cos 4x \quad (b) y = \cosh 2^x \cdot \sin 2x \quad (c) y = 1 + \ln^3(3 + x)^3$$

.....

Answer

Group 4: C Group 6	ID	الاسم:
-----------------------	----	--------

[1] Find the limits:

$$(a) \lim_{x \rightarrow \infty} \frac{x^3 - 3}{x^2 + 3} \quad (b) \lim_{x \rightarrow 0} \frac{\sin 2x}{x^2 + 2x} \quad (c) \lim_{x \rightarrow 0} \frac{\tan^2 x}{5^x - 1} \quad (d) \lim_{x \rightarrow 0} \frac{x^3}{\log(1 + x)}$$

[2] Find y' where

$$(a) y = \sin 4^x + \cosh 4x \quad (b) y = x^3 \cdot 3^x \quad (c) y = [x + \log(\tanh x)]^3$$

Answer