



Gower College Swansea
Coleg Gŵyr Abertawe

Examination Answer Book

12 Pages

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Surname ROCHAM
First name(s) SAM WILLIAM
FOLD HERE

53 %

1	Student Number	POP168 293 61
2	Title of Examination Paper	MATHEMATICS (TEST 1)
3	Reference Number of Examination/ Module Number	M4X00391
4	Date and Time of Examination	18/6/2021 14:00 pm
5	Examination Venue	SPORTS HALL
6	Seat Number	4 D

List the numbers of the questions you have attempted	Office Use
Q1 + Q2	
Q1	
a	19
b	5
c	1
d	2
e	0
Q2	
a	8
b	7
c	0
d	0
e	0
	42/80

7	Number of Answer Books handed in	1
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✓ 53 %

QUESTION ONE

Q1a

A)

19 //

i) $y = 4x^4 + 5x^3 + 2x^2 - 3x + 9$

$$\frac{dy}{dx} = 16x^3 + 15x^2 + 4x - 3 \quad \checkmark \quad (2)$$

ii) $y = 5(2x + 4)^3$

$$y = 5(6x + 12)^2$$

$$y = 5(12x + 24)$$

$$\frac{dy}{dx} = 60x + 120 \quad \times$$

6 //

iii) $y = \sqrt{x} + \ln x$

$$y = x^{\frac{1}{2}} + \ln x \quad \checkmark$$

$$\frac{dy}{dx} = \frac{1}{2}x^{-\frac{1}{2}} + \frac{1}{x} \quad \checkmark \quad (1)$$

iv) $y = \sin 5x + 6\cos 2x + 3\tan 3x$

$$\frac{dy}{dx} = 5\cos 5x - 12\sin 2x + 9\sec^2 3x \quad \checkmark \quad (3)$$

v) $y = x^3 \cos x$

(4)

$$u = x^3 \quad \checkmark$$

$$v = \cos x \quad \checkmark$$

$$\frac{du}{dx} = 3x^2 \quad \checkmark$$

$$\frac{dv}{dx} = -\sin x \quad \checkmark$$

$$\frac{dy}{dx} = (x^3)(-\sin x) + (\cos x)(3x^2)$$

$$vi) y = \frac{2x^2+3x}{e^{5x}}$$

$$u = (2x^2+3x)$$

$$v = e^{5x}$$

$$\frac{du}{dx} = (4x+3)$$

$$\frac{dv}{dx} = 5e^{5x}$$

$$\frac{dy}{dx} = \frac{(e^{5x})(4x+3) - (2x^2+3x)(5e^{5x})}{e^{10x}}$$

(5)

$$vii) y = e^{2x} \sin 2x$$

(4)

$$u = e^{2x}$$

$$v = \sin 2x$$

$$\frac{dy}{dx} = (e^{2x})(2\cos 2x) + (\sin 2x)(2e^{2x})$$

$$\frac{du}{dx} = 2e^{2x}$$

$$\frac{dv}{dx} = 2\cos 2x$$

B)

$$z = 3x^6 + 5x^2y^4 + 2y^3$$

$$\frac{dz}{dx} = 18x^5 + 10xy^4$$

$$\frac{d^2z}{dx^2} = 90x^4 + 40xy^3$$

$$\frac{dz}{dydx} = 40xy^3$$

$$\frac{dz}{dy} = 20x^2y^3 + 6y^2$$

$$\frac{d^2z}{dy^2} = 60x^2y^2 + 12y$$

$$\frac{dz}{dxdy} = 40xy^3$$

Q16

511

$$c) y = 4x^3 + 5x + 6$$

$$\frac{dy}{dx} = 12x^2 + 5$$

2f

$$\frac{d^2y}{dx^2} = 24x$$

Q1c

1

$$2(24x+5) + 3(12x^2+5) - 4x - 8 = 36x^2 + 44x + 7$$

Hence

36

x"

$$D) \quad y = 3 \cos 2x$$

Q1 c1

$$y' = -6 \sin 2x \quad \checkmark$$

2

$$y'' = -12 \cos 2x \quad \checkmark$$

$$y''' = 24 \sin 2x \quad \checkmark$$

$$y'''' = 48 \cos 2x \quad \checkmark$$

$$E) \quad y = x^2 - 6x + 5$$

$$y = x - 3$$

Q1 e

$$0 = x^2 - 5x + 2 \quad \times$$

06

$$(x-1) (x+2)$$

$$\boxed{x=1}$$

$$\boxed{x=-2} \quad \times$$

$$y = 1^2 - 6 \times 1 + 5$$

$$y = -2^2 - 5 \times -2 + 2$$

$$y = 1^2 - 5 \times 1 + 2$$

$$y = 0$$

$$y = 1^2 - 5 \times 1 + 2$$

$$y = -2$$

$\times$

$$\boxed{y=8}$$

$$\boxed{y=-2}$$

QUESTION TWO

A)

i) $\ln(3x-5) + \ln(3x+4) = 2\ln(3x-4)$

$$\ln(3x-5) + \ln(3x+4) = 2\ln(3x-4)$$

$$(3x-5) + (3x+4) = (3x-4)(3x-4)$$

$$9x + 12x - 15x + 20 = 9x - 12x - 12x + 16$$

$$= x^2 + 27x + 36$$

$$x = \frac{-27x \pm \sqrt{27^2 - 4(1)(36)}}{2x}$$

$$x = \frac{-27x \pm \sqrt{729x - 4(1)(144)}}{2x}$$

$$x = 1.40 \quad 1.40$$

Hence using quadratic equation

ii) $3^{2+x} \cdot 2^{3-x} = 5^x$

$$(2+x)\ln 3 + (3-x)\ln 2 = (x)\ln 5 \quad (2)$$

$$(2+x)1.10 + 0.69 = (x)1.609$$

$$\text{iii)} \quad \frac{4}{2x+5} = \frac{6}{x+2}$$

(3)

$$6(2x+5) = 4(x+2) \quad \checkmark$$

$$12x+30 = 4x+8 \quad \checkmark \checkmark$$

$$8x = -22$$

$$x = \frac{-22}{8} = \frac{-11}{4} \quad \checkmark$$

$$\text{iv)} \quad \frac{(x+2)}{6} + \frac{(7x+1)}{9} = \frac{2x}{18}$$

$$\frac{3(x+2)}{18} + \frac{2(7x+1)}{18} = \frac{2x}{18} \quad \checkmark$$

$$3(x+2) + 2(7x+1) = 2x \quad \checkmark \checkmark \checkmark$$

$$3x+6 + 14x+2 = 2x \quad \checkmark \checkmark \checkmark \quad (3)$$

$$17x+8 = 2x$$

$$8 = \frac{2x}{17x} \quad \times$$

$$\frac{8}{17} = x \quad \times$$

$$x = 0.47 \quad \times$$

B)

i) $T^2 + 8T + 15$

$(T+3) (T+5) \checkmark \textcircled{2}$

~~$(T+3)$~~

~~$(T+5)$~~

ii) $5q^2 + 17q + 6$

$(5q+1)$

$(q+6)$

X

Q2

~~$(5q+1)$~~

~~$(q+6)$~~

iii) $N^2 - 121$

$(N-11) (N+11) \checkmark$

 $\textcircled{2}$

~~$(N-11)$~~

~~$(N+11)$~~

iv) $m^2 - 4mn + 3m - 12n$

$m(m-4n) 3(m-4n)$

 $\textcircled{3}$

$(m-4n)$

$(m+3) \checkmark$

✓

C) i) $6x^2 + 19x + 15 = 0$

Q2c

$(6x+3)(x+5) = 0$ ✗

Q1

$x = -3$

$x = -5$ ✗

Q1

ii) $x^2 = -2x + 24$

$0 = x^2 - 2x + 24$

$(x-2)(x-12) = 0$ ✗

Q1

$x = 2$

$x = 12$ ✗

iii) $2x^2 - 21 = 11x$

$0 = 2x^2 + 11x - 21$ ✗

Q1

$(2x-3)(x+7) = 0$ ✗

$x = 3$

$x = -7$ ✗

D) $6x^2 - 13x - 8 = 0$

$a = 6$ ✗

~~$x = \frac{-13x \pm \sqrt{13x^2 - 4(6x^2)(-8)}}{2(6x^2)}$~~

Q2d

$b = -13$ ✗

$c = -8$ ✗

$x = \frac{-13x \pm \sqrt{13x^2 - 4(6x^2)(-8)}}{2(6x^2)}$

Q1

~~$x = \frac{-13x \pm \sqrt{169x^2 + 192x^2 - 8}}{12x^2}$~~

$$x = \frac{-13x \pm \sqrt{-13x^2 - 4(6x^2) - 8}}{2(6x^2)} \quad \times$$

$$x = \frac{-13x \pm \sqrt{26x - 4(12x) - 8}}{2(12x)} \quad \times$$

$$x = \frac{-13x \pm \sqrt{-26x - 48x - 32}}{24x} \quad \times$$

$$x = \frac{-13x \pm \sqrt{74x - 32}}{24x} \quad \times$$

E) $T = 2\pi \sqrt{\frac{L}{mgh}}$

$$2\pi T = \sqrt{\frac{L}{mgh}} \quad \times$$

$$2\pi T = \left(\frac{L}{mgh}\right) \quad \circ$$

$$\cancel{L 2\pi T} = mgh$$

$$L 2\pi T = mgh$$

$$\cancel{\frac{L 2\pi T}{H} = 1}$$

$$\frac{L 2\pi T}{H} = mg \quad \times$$

$$\frac{L 2\pi T}{H g} = m$$

Q2
e

Q3