



Examination Answer Books

12 Pages

Instructions to Candidates

1. Please give the information requested in the boxes below.
2. Enter your name in the space provided to the right, fold over and seal down (using the label provided) to hide your name.
3. The answers must be legibly written. The Examiners can either ignore illegible script or have it typed and the expense of typing charged to the candidate.
4. Write your answers in ink.
5. Begin each answer on a fresh page. Do all rough work in the answer book and cross it through.
6. No part of this book is to be torn out; it must be handed in complete.
7. If more books than one are used, fasten them together using the tags available from the invigilator(s).
8. Every book must be handed in. In no circumstances may answer books, used or unused, be taken out of the examination venue.

Complete, fold and seal
(see note 2 below)

SURNAME: Weaver

FORENAME(S): Steffan

1	Student Number	Wea19853802
2	Title of Examination Paper	Mathematics Test 1
3	Module Code	GOEN4001
4	Date and Time of Examination	23 / 01 / 23 13:30
5	Examination Venue	Ward 2 Gower College
6	Seat Number	17
7	Number of Answer Books handed in	

List the numbers of the questions you have attempted	Office Use
Q1a	18
b	4
c	2
d	2
Q2a	8
b	2
c	0
d	1
e	5
Q3a	8
b	5
c	0
d	4
Total	59%

59%

Q1

Q1a

18/23

a) i) $\frac{dy}{dx} = 24x^3 + 15x^2 + 6x + 6$ ✓ 2 //

ii) $\frac{dy}{dx} = 5\cos 5x - 2\sin 4x + 2\sec^2 3x$ ✓ 2 //

iii) $x^5 + \frac{1}{x^4} \frac{dy}{dx} = x^{-5} + x^4$ ✗ 0 //

iv) $\frac{dy}{dx} = \sin 2x (5e^{4x}) + e^{5x} (2\cos 2x)$ ✓ 3 //

v) $\frac{dy}{dx} = 60(2x^3 + 3)^3 \times 6x^2$ ✓ 3 //

vi) $\frac{dy}{dx} = -\frac{1}{x}(2/x^2) + 5$ ✗ 0 //

vii) $\frac{dy}{dx} = 4x^5(\frac{1}{x}) + \ln x(20x^4)$ $u = 4x^5 \quad \frac{du}{dx} = 20x^4 \quad \frac{dy}{dx} = \frac{1}{x}$ ✓ 4 //

viii) $\frac{dy}{dx} = \frac{dy}{dx} = \frac{(e^{5x})(-16\sin 4x) - (4\cos 4x)(3e^{2x})}{(e^{2x})^2}$ ✓ 4 //

b)

i) $\frac{dw}{dx} = 16x^3 + 9x^2y^3 \rightarrow \frac{d^2w}{dx^2} = 48x^2 + 18xy^3$ ✓

Q1b

ii) $\frac{dw}{dy} = 9x^3y^2 + 4y \rightarrow \frac{d^2w}{dy^2} = 18x^3y + 4$ ✓

4/6

iii) $\frac{d^2w}{dxdy} = 54x^2y$ ✗ 4 //

iv) $\frac{d^2w}{dydxdx} = 54xy^2$ ✗

c) $\frac{dy}{dx} = 16x + 6 \rightarrow \frac{dy}{dx^2} = 16$

?

Q1c2/4

d) $\frac{dy}{dx} = -6\sin 3x \rightarrow \frac{d^2y}{dx^2} = -18\cos 3x \rightarrow \frac{d^3y}{dx^3} = 54\sin 3x$

$\frac{d^4y}{dx^4} = 162\cos 3x$

Q1d2/2Q2

a)

$\frac{2x+5}{(x-2)(x+1)} = \frac{A}{(x-2)} + \frac{B}{(x+1)}$

Q2a8/10

$2x+5 = A(x+1) + B(x-2)$

$15 = A(5+1) + B(5-2)$

$15 = A(6) + B(7)$

$15 = 7B$

$15 \div 7 = B$

$2.1 = B$

$9 = A(3) + B(4)$

$9 = 3A + 4B$

$9 \div 3 = A$

$3 = A$

So, $\frac{2x+5}{(x-2)(x+1)} = \frac{3}{(x-2)} + \frac{2.1}{(x+1)}$

X error carried forward

b) $AB = 15m$

$a^2 = b^2 + c^2 - 2bc \cos(A)$

$AC = 18m$

Q2b2/4

i) $15^2 + 18^2 - 2 \times 15 \times 18 \cos 100 = 642.77$

$\sqrt{642.77} = 25.35m$

c) $x^2 - 5x + 6$

$$(x^2 - 5)(x + 6) = 0 \quad \times$$

$$2x^2 = -6 + 5$$

$$2x^2 = -1 \quad \times$$

$$x^2 = -1 \div 2$$

$$x = \sqrt{-0.5} \quad \times$$

~~xxx~~

Q2c

0

Q2

d) $y = x^2 - 6x + 5$

$$y = x - 3$$

$$x^2 - 6x + 5 = x - 3 \quad \checkmark$$

$$x^2 - 7x + 8 = 0 \quad \checkmark$$

$$x^2 - 7x = -8$$

$$x^2 - x = -2 + 7$$

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

$$x = \sqrt{5}$$

$$x = 2.24 \quad \times$$

Q2d

1/6

e)

i) $\sin^{-1} 0.85 = 58.2^\circ \quad \checkmark \quad 180 - 58.2 = 121.8^\circ \quad \checkmark$

$$x = 58.2^\circ, 121.8^\circ \quad \checkmark \quad \checkmark$$

ii) $4 \div 5 = \frac{4}{5} \quad \cos^{-1} \frac{4}{5} = 36.87^\circ \quad \checkmark \quad 360 - 36.87 = 323.13^\circ \quad \checkmark \quad \underline{\underline{3}}$

$$x = 36.87^\circ, 323.13^\circ \quad \checkmark \quad \checkmark$$

iii) $\tan^{-1} 0.8 = 38.66^\circ \quad \checkmark \quad 180 + 38.66 = 218.66^\circ \quad \checkmark \quad \underline{\underline{0}}$

$$x = 38.66^\circ, 218.66^\circ \quad \times \quad \checkmark$$

Q2e

5/7

Q3

a)

i) $\log(x)(x-2) = \log(x+100)$

$$\log(x) + \log(x-2) = \log(x+100)$$

$$(x) + (x-2) = (x+100)$$

$$2x - 2 = x + 100$$

$$2x - x = 100 + 2$$

$$x = 102$$

Q 3

a)

$$ii) (3x+2)+(x+1) = 12 \quad \times$$

$$4x+3 = 12 \quad \times$$

$$4x = 12-3 \quad \times$$

$$4x = 9 \quad \times$$

$$x = 9 \div 4$$

$$x = 2.25 \quad \times$$

$$iv) \frac{2x-2}{3x+9} \times \frac{4}{3} \rightarrow 3(2x-2) = 4(3x+9) \quad \checkmark$$

$$6x-6 = 12x+36 \quad \checkmark$$

$$-6-36 = 12x-6x \quad 6x-12x = 36+6 \quad \checkmark$$

$$-42 = 6x \quad \checkmark$$

$$-6x = 42 \quad \checkmark$$

$$-42 \div 6 = x \quad \checkmark$$

$$x = 42 \div -6 \quad \checkmark$$

$$-21 = x \quad \checkmark$$

$$x = -7 \quad \checkmark$$

v)

$$9 \times 7 \times 12 = 756 \quad 9 \times 7 = 63 \quad \checkmark$$

$$63 \div 9 = 7 \quad \checkmark \quad 63 \div 7 = 9 \quad \checkmark$$

$$63 \times 12 = 756 \quad \checkmark$$

$$\frac{63(x+4)}{9} + \frac{63(2x-1)}{7} = 63(12) \quad \checkmark$$

$$7(x+4) + 9(2x-1) = 756$$

$$7x+28+18x-9 = 756 \quad \checkmark$$

$$25x+19 = 756 \quad \checkmark$$

$$25x = 756-19 \quad \checkmark$$

$$25x = 737$$

$$x = 737 \div 25$$

$$x = 29.48 \quad \checkmark$$

$$iii) \log_4^{(1-2x)} \times 6^{(3x+4)} = \log_2^{(5x)} \quad \checkmark$$

$$\log_4^{(1-2x)} + \log_6^{(5x+4)} = \log_2^{(5x)} \quad \checkmark$$

2

Q 3a

8/18

b)

$$\begin{aligned}
 & i) \quad \cancel{z^2 - 7z + 2z + 14} \quad \cancel{z^2 - 2z + 7z + 14} \\
 & \quad \cancel{z(z-7) + 2(z+7)} \quad \cancel{z(z-2) + 7(z+2)} \\
 & \quad \cancel{(z+2)(z-2)} \quad (z+7)(z-2)
 \end{aligned}$$

Q3b516

$$ii) (q+9)(q-9) \quad \checkmark \quad \underline{\underline{2}}$$

$$iii) \quad \underline{12xu - 3xv} + \underline{28yu - 7yv}$$

$$\begin{aligned}
 & 3x(4u-v) + 7y(4u-v) \quad \checkmark \\
 & (3x+7y)(4u-v) \quad \checkmark \quad \underline{\underline{2}}
 \end{aligned}$$

c)

$$i) \quad 8m^2 - 2m - 21 = 0$$

$$8m^2 - 2m = 21 \quad \times$$

$$8m^2 - 2m = \sqrt{21}$$

$$6m = 4.58 \quad \times \quad \underline{\underline{0}}$$

$$m = 4.58 \div 6$$

$$m = 0.76 \quad \checkmark$$

Q3c014

$$ii) \quad w^2 + 13w + 40 = 0$$

$$w^2 + 13w = -40 \quad \times$$

$$w^2 + 13w = \sqrt{-40} \quad \times \quad \underline{\underline{0}}$$

$$14w = -6.3$$

$$w = -6.3 \div 14$$

$$w = -0.45 \quad \checkmark$$

d)

$$\begin{array}{ccc}
 a & b & c \\
 6x^2 - 8x - 30 = 0
 \end{array}$$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad \checkmark$$

Q3d414

$$a = 6 \quad \checkmark$$

$$b = -8 \quad \checkmark$$

$$c = -30 \quad \checkmark$$

$$\begin{array}{c}
 8 \pm \sqrt{8^2 - 4 \times 6 \times -30} \\
 2 \times 6
 \end{array}$$

$$= 3 \quad \checkmark$$

$$\text{or}$$

$$= -1.6 \quad \checkmark$$