

PRIFYSGOL CYMRU

Y Drindod Dewi Sant

UNIVERSITY OF WALES

Trinity Saint David

Examination Answer Book

12 Pages

Instructions to candidates

1. Please give the information requested in the boxes below.
2. Enter you name in the space provided to the right and seal 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.

1	Student Number	
2	Title of Examination Paper	TC2
3	Module Code	PCEE4000
4	Date and Time of Examination	22.5.19 9:15
5	Examination Venue	Pembrokehouse college
6	Seat Number	

7	Number of Answer Books handed in	
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[illegible]

Second Mark *St. H*

(Gweler yr ochr arall am y fersiwn Cymraeg)

— FOLD

Complete section, remove strip, fold as indicated and SEAL.

Please complete this section and SEAL before the examination starts.

Surname Mason (Block Capitals) Forename(s) Chloe

PATENT PENDING

PULL & TEAR

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7.

i. $A(0.75) \quad B(0.82)$

$$0.75 \times 0.82 = 0.615 \quad \checkmark$$

ii. $\bar{A} = 1 - 0.75 = 0.25$

$$\bar{B} = 1 - 0.82 = 0.18$$

$$\bar{A} \times \bar{B} = 0.25 \times 0.18 = 0.045$$

A $1 - 0.045 = 0.955 \quad \checkmark$

(8)

6.

Time (s)	frequency	(x) midpoint	fx	$f(x - \bar{x})^2$
0 ≤ t < 10	2	5	10	800
10 ≤ t < 20	10	15	150	1000
20 ≤ t < 30	17	25	425	0
30 ≤ t < 40	8	35	280	800
40 ≤ t < 50	3	45	135	1200

$$\Sigma f = 40$$

$$\Sigma fx = 1000 \quad \checkmark$$

$$\Sigma f(x - \bar{x})^2 = 3800 \quad \checkmark$$

$$\bar{x} = \frac{\Sigma fx}{\Sigma f} = \frac{1000}{40} = 25 \quad \checkmark$$

$$s = \sqrt{\frac{\Sigma f(x - \bar{x})^2}{\Sigma f - 1}} = \sqrt{\frac{3800}{40 - 1}} = 9.871 \quad \checkmark$$

(14)

✓ sop

1.

$$i. y = 5x^2 + \frac{5}{x^2} - 8$$

$$y = 5x^2 + 5x^{-2} - 8$$

$$\begin{aligned} \frac{dy}{dx} &= 2 \times 5x^{2-1} - 2 \times 5x^{-2-1} \checkmark \\ &= 10x - 10x^{-3} \checkmark \\ &= 10x - \frac{10}{x^3} - 8 \quad ?? \end{aligned}$$

(3)

$$ii. y = x^3 \cos x$$

$$u = 1x^3$$

$$v = 1 \cos x$$

$$\frac{du}{dx} = 3 \times 1x^{3-1}$$

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

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

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

$$\frac{dy}{dx} = 1x^3 \times -\sin x + 1 \cos x \times 3x^2 \checkmark$$

$$= 1x^3 - \sin x + 3x^2 \cos x$$

$$= x^3 (1 - \sin x)$$

$$1x^2 (-\sin x + 3 \cos x)$$

(3)

$$iii. y = 4 \sin(2x-3)$$

$$u = 2x-3$$

$$\frac{dy}{dx} = 1 \times 4 \cos$$

$$\frac{dy}{dx} = 4 \cos u \checkmark$$

$$\frac{dy}{dx} = 4 \cos u$$

$$\frac{dy}{dx} = 8 \cos(2x-3) \checkmark$$

$$\frac{du}{dx} = 1 \times 2x^{1-1}$$

$$\frac{du}{dx} = 2x^0$$

$$= 2 \checkmark$$

(6)

✓
5/11

$$\text{iv. } y = \frac{2\sin 3x}{x^3}$$

$$u = 2\sin 3x$$

$$\frac{du}{dx} = 3 \times 2 \overset{\cos}{\cancel{\sin}} 3x$$

$$\frac{du}{dx} = 6\cos 3x \quad \checkmark$$

$$v = 1x^3$$

$$\frac{dv}{dx} = 3 \times 1x^{3-1}$$

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

$$\frac{dy}{dx} = \frac{1x^3 \times 6\cos 3x - 2\sin 3x \times 3x^2}{(1x^3)^2}$$

$\checkmark$

(3)

$\checkmark$

501

$$2. \quad i = 2(7 - 3e^{-0.5t}) \\ = 14 - 6e^{-0.5t} \quad \checkmark$$

$$t=0$$

$$= 14 - 6e^{-0.5 \times 0}$$

$$= 14 - 6 = 14 \text{ V/s} \quad \checkmark$$

①

3.

$$i. \quad \int_1^3 (5 - 4x + 4x^3) dx$$

~~Wrong~~

$$\left[\frac{5^{0+1}}{0+1} - \frac{4x^{1+1}}{1+1} + \frac{4x^{3+1}}{3+1} \right]_1^3$$

$$\left[5 - 2x^2 + x^4 \right]_1^3$$

$$= (5 - 2 \cdot 3^2 + 3^4) - (5 - 2 \cdot 1^2 + 1^4) = 68 - 4 = 64$$

Correct method

$$x=3 \quad 5 - 2 \cdot 3^2 + 3^4 = 68 \quad \checkmark \text{ (upper limit)}$$

$$x=1 \quad 5 - 2 \cdot 1^2 + 1^4 = 4 \quad \checkmark \text{ (lower limit)}$$

$$\text{area} = \text{upper} - \text{lower} = 68 - 4 = 64 \text{ units}^2 \quad \checkmark$$

④

✓

11. $\int_{-\pi}^{\pi} 3\sin x + 6\cos \frac{1}{2}x \, dx$

AB

~~$-\left(\frac{1}{1} 3\sin x + \frac{1}{2} 6\cos \frac{1}{2}x\right)$~~

$\left[-\frac{1}{1} 3\cos x + \frac{1}{2} \sin \frac{1}{2}x\right]_{-\pi}^{\pi}$

$\left[-3\cos x + \frac{1}{2} 2\sin \frac{1}{2}x\right]_{-\pi}^{\pi}$

$x = \pi$

$-3\cos(\pi) + \frac{1}{2} 2\sin(\frac{1}{2}\pi) = 3.5$

$x = -\pi$

$-3\cos(-\pi) + \frac{1}{2} 2\sin(\frac{1}{2}-\pi) =$

~~$\left[\sin x\right]$~~

$\left[-\frac{1}{1} \cos 1x + 2\frac{\sin \frac{1}{2}x}{\frac{1}{2}}\right]_{-\pi}^{\pi}$

$x = \pi$

$-1\cos 1(\pi) + 2\sin \frac{1}{2} \times \pi = 3$

$x = -\pi$

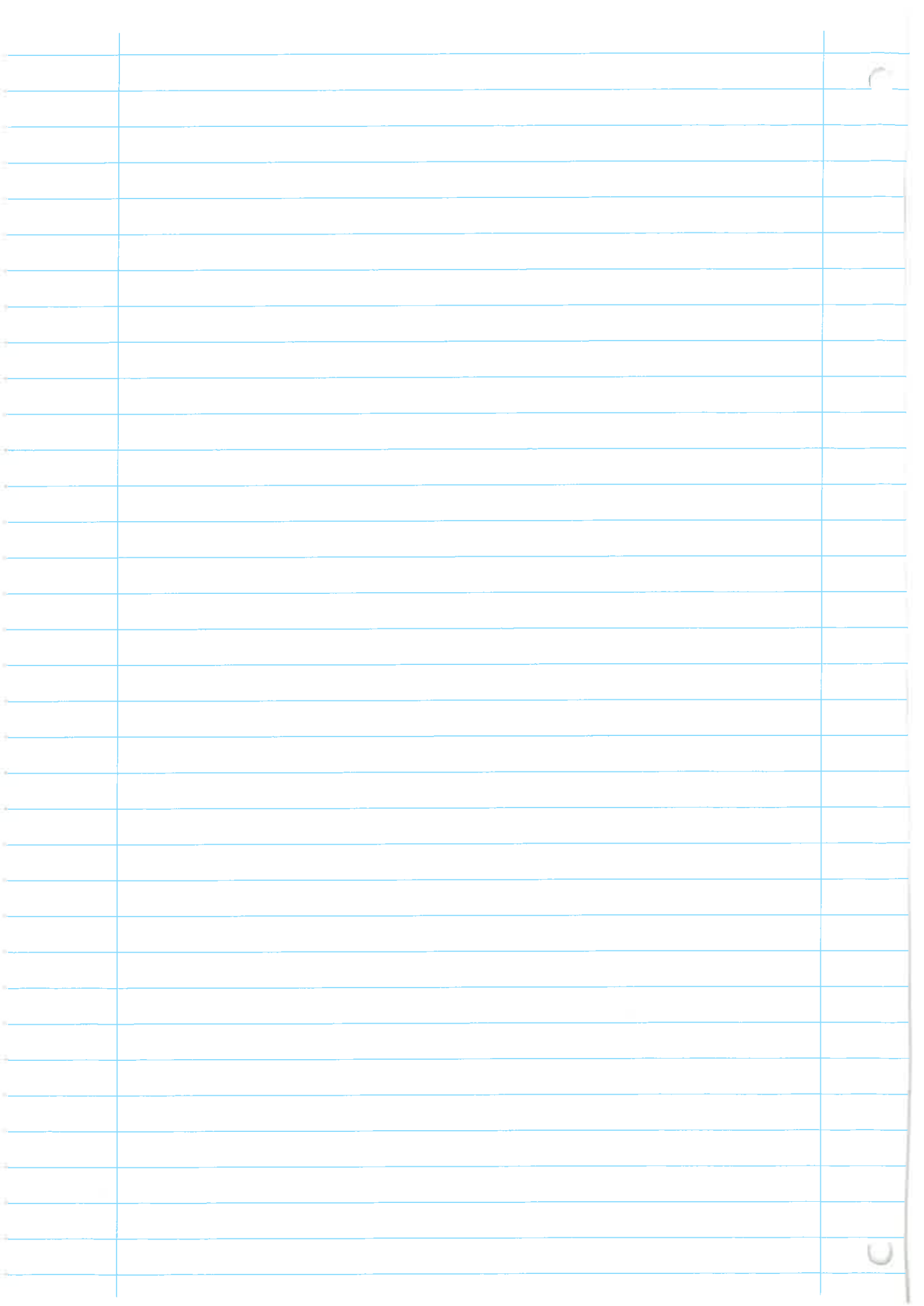
$-1\cos 1(-\pi) + 2\sin \frac{1}{2} \times -\pi = -3$

X

(0)

✓

SDP



5. $\int_3^4 \frac{5x-6}{4x(x-2)}$

$\frac{4-3}{4} = 0.25$ ✓

x_A	3	3.25	3.5	3.75	4
y	y_0	y_1	y_2	y_3	y_4

③

✓
SDP

