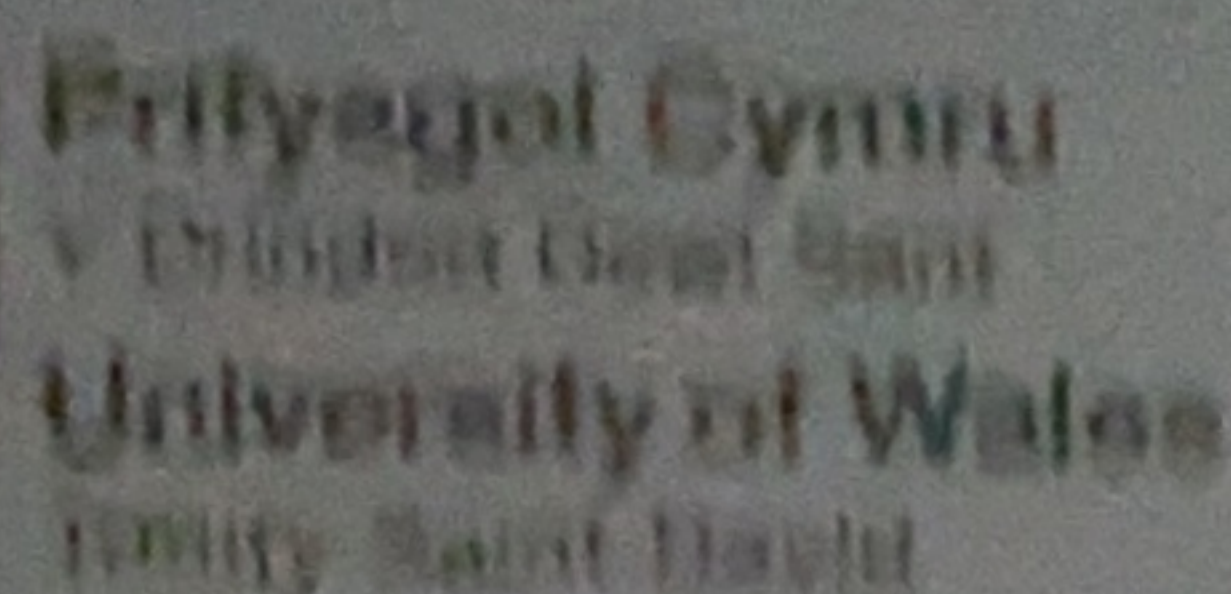




11-11-11

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.

1	Student Number	1906957
2	Title of Examination Paper	MATHS
3	Module Code	ACDA 4008
4	Date and Time of Examination	12/3/2020 09:30
5	Examination Venue	UWTSO IQ208
6	Seat Number	
7	Number of Answer Boxes Handled in	

[illegible]

⑤ i) $z_1 = \frac{3-2j}{2+j}$ and $z_2 = \frac{3+2j}{1-2j}$

$$z_1 - z_2 = \frac{3-j}{2+j} - \frac{3+2j}{1-2j}$$

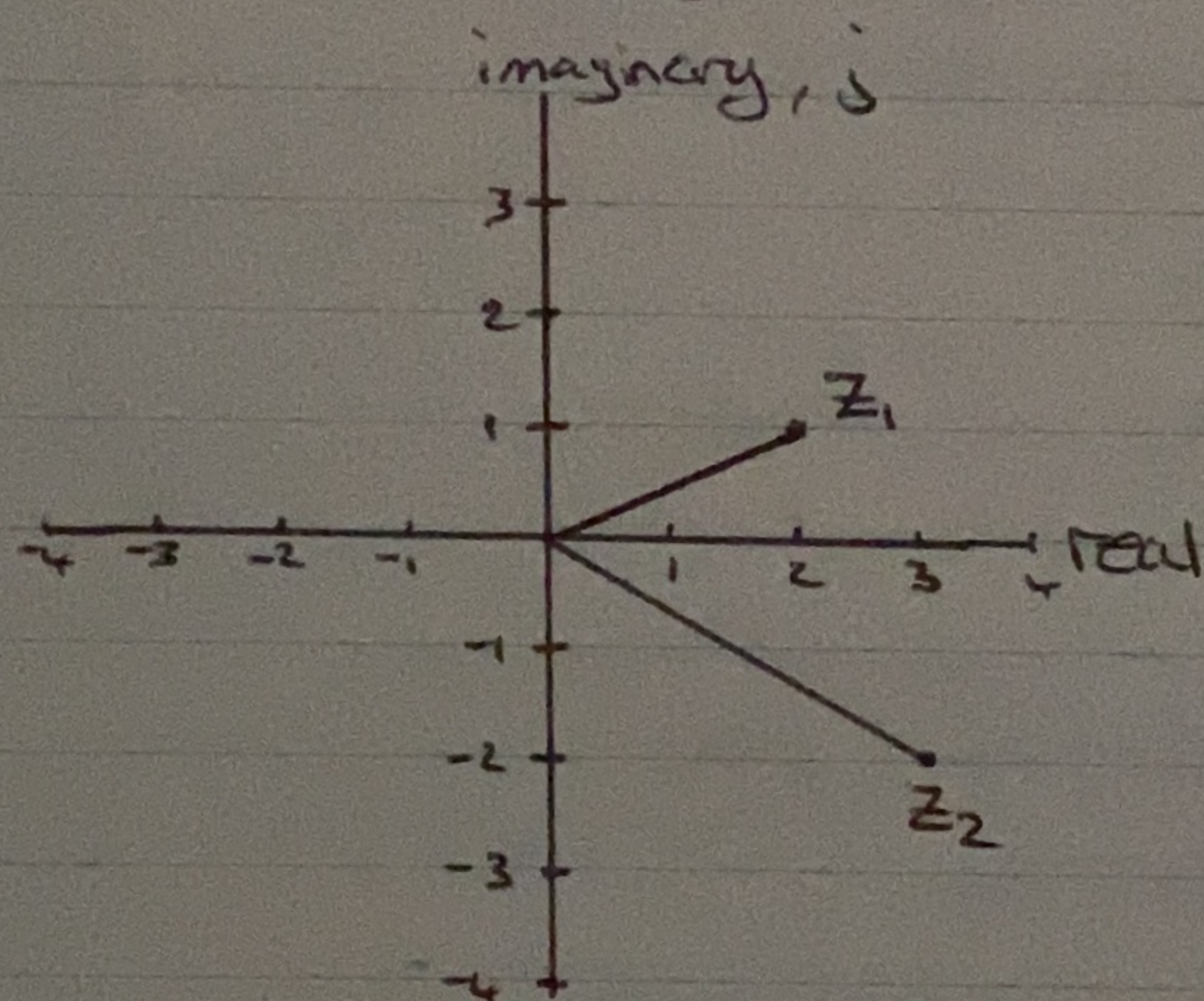
$$= \frac{(3+3)}{(2+1)} - \frac{(-j+2j)}{(j-2j)}$$

$$= \frac{6}{3} - \frac{j}{-j}$$

0

⑤ ii) Argand diagram

Plot: $z_1 = 2 + 1j$, and
 $z_2 = 3 - 2j$



2

5.1)

$$z^2 - 4z + 13 = 0$$

$$\text{are } 2+3j \text{ and } 2-3j$$

Expressed as Polar form.

$$x = r \cos \theta$$

$$y = r \sin \theta$$

$$\therefore x = 2 \times \cos 3j, \text{ and}$$

$$y = 2 \times \sin -3j$$

① i)

$$f(x) = 6x^{-3} + 2$$

$$= -3 \times 6 x^{-3-1} + 0 + 2x^{-1}$$

$$= -18x^{-4} + 0$$

$$= -18x^{-4}$$

$$(7x^{-1})$$

$$7.5$$

ii)

$$f(x) = -4xe^{2x} - 9x$$

$$= 2 \times (-4x)e^{2x-1} - 1 \times 9x^{-1}$$

$$= -8xe^{2x-1} - 9$$

$$2$$

PANIC!!

⑤ iv) $x^2 - 4x + 13 = 0$

quadratic general set up =

$$ax^2 + bx + c = 0$$

$\therefore a = 1, b = -4$ and $c = 13$

Quadratic Formula =

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Substituting a, b and c into the formula

$$x = \frac{-1 \pm \sqrt{(-4)^2 - 4(1)(13)}}{2(1)}$$

$$= \frac{-1 \pm \sqrt{-4^2 - 52}}{2}$$

$$= \frac{-1 \pm \sqrt{-16 - 52}}{2}$$
$$= \frac{-1 \pm \sqrt{-68}}{2}$$

~~$$z = \frac{-1 \pm \sqrt{1 \pm 2j}}{2}$$~~

$$j^2 = -1$$

$$z = \frac{-1 \pm \sqrt{1 \pm 2j}}{2}$$

~~$$z = \frac{-1 \pm \sqrt{1 \pm 2j}}{2}$$~~

Now sketch!

$$2$$

$$2 + 3j, \text{ and } 2 - 3j$$

in polar form

$$x = r \cos \theta \Rightarrow x = 2 \cos 3j$$

$$y = r \sin \theta \Rightarrow y = 2 \sin -3j$$

Q5 a)

$$z = (\sqrt{3} + j)^5$$

$$r = \sqrt{\sqrt{3}^2 + 1^2}$$

$$= \sqrt{3^2 + 1^2}$$

$$= \sqrt{9 + 1}$$

$$= \sqrt{10}$$

$$\theta = \tan^{-1}(1/\sqrt{3})$$

$$= \tan^{-1} \frac{1}{\sqrt{3}}$$

$$= 30$$

$$z = r \cos \theta + j \sin \theta$$

$$= \sqrt{10} \cos 30 + \sqrt{10} (1) \sin 30$$

$$= \sqrt{10} (\cos 30 + j \sin 30)$$

$$= \sqrt{10} (\cos(30) + (1 \times \sin(30)))$$

$$= \sqrt{10} \angle (\cos(30) + (1 \times \sin(30)))$$

0