

SUBJECT: MATH EXAM 2nd Annual 20 22 CLASS: Inter P-I
 GROUP: I DATE: 21-12-22

(GENERAL INSTRUCTIONS FOR MARKING KEY)

Section - B

2.
(i).

$$\frac{\frac{1}{a} - \frac{1}{b}}{1 - \frac{1}{a} \cdot \frac{1}{b}}$$

$$= \frac{\frac{1 \cdot b}{a \cdot b} - \frac{a \cdot 1}{a \cdot b}}{\frac{1 \cdot 1}{a \cdot b} - \frac{1 \cdot 1}{a \cdot b}} \quad (\text{Golden rule of fraction})$$

$$= \frac{\frac{b}{ab} - \frac{a}{ab}}{\frac{1}{ab} - \frac{1}{ab}} \quad (\text{Rule for Product of fractions})$$

$$= \frac{ab - \frac{1}{ab}}{ab} \quad (1M)$$

$$= \frac{1}{ab} \cdot \frac{(b-a)}{(b-a)} \quad (\text{Distributive property})$$

$$= \frac{1}{ab} \cdot (ab-1)$$

$$= \frac{b-a}{ab-1} \quad (1M)$$

Let

$$(ii) \quad z = \frac{2-7i}{4+5i}$$

$$= \frac{(2-7i)(4-5i)}{(4+5i)(4-5i)} \quad (1M)$$

$$z = \frac{-27-38i}{41}$$

$$\operatorname{Re}(z) = -\frac{27}{41}; \quad \operatorname{Im}(z) = -\frac{38}{41} \quad (1M)$$

$$(iii) \quad \text{Let } z = 1 + i\sqrt{3}$$

Taking

$$x = r \cos \theta = 1; \quad y = r \sin \theta = \sqrt{3}$$

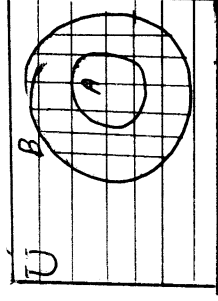
$$r = \sqrt{x^2 + y^2} \\ r = 2; \quad \theta = \tan^{-1} \frac{y}{x} = \tan^{-1} \frac{\sqrt{3}}{1}$$

$$= \frac{\pi}{3} \text{ radian} \quad (1M)$$

Required polar form

$$1 + i\sqrt{3} = 2 \left(\cos \frac{\pi}{3} + i \sin \frac{\pi}{3} \right) \quad (1M)$$

$$(iv) \quad \text{Let } A \subset B$$



$$A - B = \bar{B} \cap A \\ (A - B)^c = \bar{A} \cup B$$

Horizontal lines represent

$$(A - B)^c$$

The Common Horizontal lines with

vertical lines represent

$$(A - B) \cap B \quad (1M)$$

$$\text{Thus } (A - B) \cap B = B \quad (1M)$$

* Students can perform similar results with different cases (A and B are overlapping, A and B are disjoint sets or B ⊂ A)

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