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Page 5 of 8

Question 1: Complex numbers

Q1a i). $Z_1 = 7 + 5j$ $Z_2 = 3 - 7j$ $Z_3 = -2 + 6j$

$$\therefore Z_1 + Z_3 = (7 + 5j) + (-2 + 6j)$$

$$\therefore 7 + 5j + -2 + 6j =$$
$$= 5 + 11j$$

(ii) $Z_1 - Z_3 = (7 + 5j) - (-2 + 6j)$

$$7 + 5j - -2 + 6j$$
$$= 9 - j$$

(iii) $\frac{Z_1}{Z_2} = \frac{(7 + 5j)}{(3 - 7j)}$

$$\therefore = \frac{(7 + 5j)(3 + 7j)}{(3 - 7j)(3 + 7j)} = \frac{21 + 49j + 15j + 35j^2}{9 + 21j - 21j + -49j^2}$$

$$\therefore = \frac{21 + 64j - 35}{9 + 49} = \frac{-14 + 64j}{58}$$

$$\therefore \frac{-14}{58} + \frac{64j}{58}$$

(iv) $\bar{Z}_1 - \bar{Z}_2$

$$\therefore (7 - 5j) - (3 + 7j)$$

$$\therefore = 4 - 12j$$