

Exercise 1

Locate the numbers $z_1 + z_2$ and $z_1 - z_2$ vectorially when

$$(a) z_1 = 2i, \quad z_2 = \frac{2}{3} - i;$$

$$(b) z_1 = (-\sqrt{3}, 1), \quad z_2 = (\sqrt{3}, 0);$$

$$(c) z_1 = (-3, 1), \quad z_2 = (1, 4);$$

$$(d) z_1 = x_1 + iy_1, \quad z_2 = x_1 - iy_1.$$

Solution

Part (a)

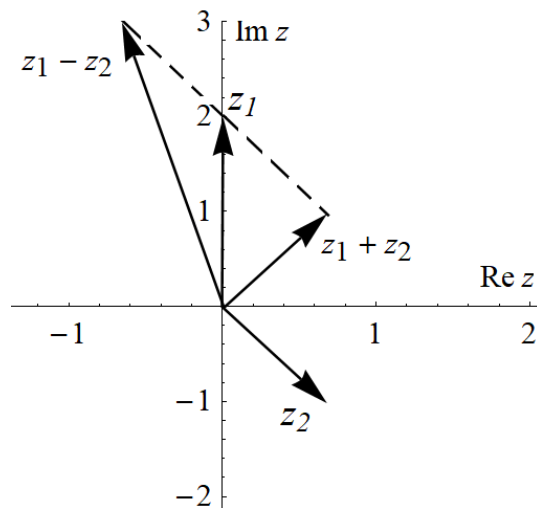
The complex numbers are

$$z_1 = 2i \quad \text{and} \quad z_2 = \frac{2}{3} - i.$$

The sum and difference of these two are

$$z_1 + z_2 = 2i + \left(\frac{2}{3} - i\right) = \frac{2}{3} + i$$

$$z_1 - z_2 = 2i - \left(\frac{2}{3} - i\right) = -\frac{2}{3} + 3i.$$



Part (b)

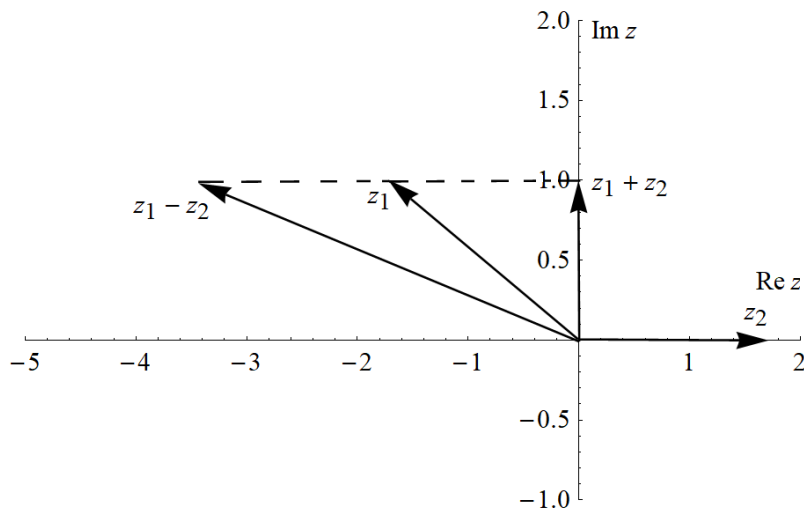
The complex numbers are

$$z_1 = -\sqrt{3} + i \quad \text{and} \quad z_2 = \sqrt{3}.$$

The sum and difference of these two are

$$z_1 + z_2 = (-\sqrt{3} + i) + \sqrt{3} = i$$

$$z_1 - z_2 = (-\sqrt{3} + i) - \sqrt{3} = -2\sqrt{3} + i.$$



Part (c)

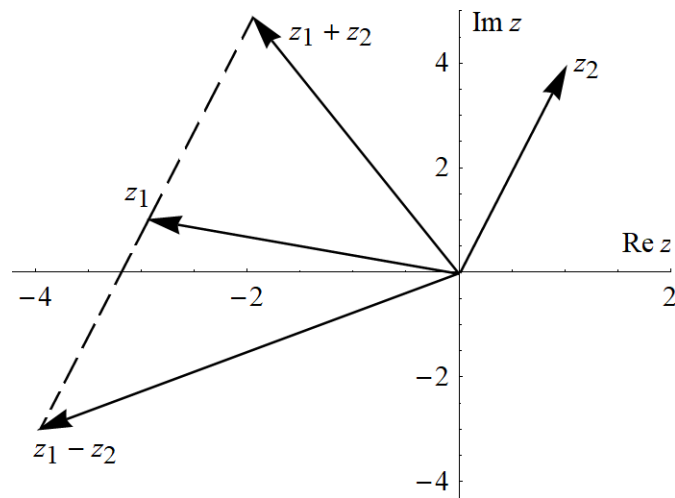
The complex numbers are

$$z_1 = -3 + i \quad \text{and} \quad z_2 = 1 + 4i.$$

The sum and difference of these two are

$$z_1 + z_2 = (-3 + i) + (1 + 4i) = -2 + 5i$$

$$z_1 - z_2 = (-3 + i) - (1 + 4i) = -4 - 3i.$$



Part (d)

The complex numbers are

$$z_1 = x_1 + iy_1 \quad \text{and} \quad z_2 = x_1 - iy_1.$$

The sum and difference of these two are

$$z_1 + z_2 = (x_1 + iy_1) + (x_1 - iy_1) = 2x_1$$

$$z_1 - z_2 = (x_1 + iy_1) - (x_1 - iy_1) = 2iy_1.$$

