

1 a

$$\begin{aligned}z^2 + 4 &= 0 \\z^2 - 4i^2 &= 0 \\(z - 2i)(z + 2i) &= 0 \\z &= \pm 2i\end{aligned}$$

b

$$\begin{aligned}2x^2 + 18 &= 0 \\z^2 + 9 &= 0 \\z^2 - 9i^2 &= 0 \\(z - 3i)(z + 3i) &= 0 \\z &= \pm 3i\end{aligned}$$

c

$$\begin{aligned}3z^2 + 15 &= 0 \\z^2 + 5 &= 0 \\z^2 - 5i^2 &= 0 \\(z - \sqrt{5}i)(z + \sqrt{5}i) &= 0 \\z &= \pm \sqrt{5}i\end{aligned}$$

d

$$\begin{aligned}(z - 2)^2 &= -16 \\z - 2 &= \pm 4i \\z &= 2 \pm 4i\end{aligned}$$

e

$$\begin{aligned}(z + 1)^2 &= -49 \\z + 1 &= \pm 7i \\z &= -1 \pm 7i\end{aligned}$$

f

Complete the square.

$$\begin{aligned}z^2 - 2z + 1 + 2 &= 0 \\(z - 1)^2 - 2i^2 &= 0 \\(z - 1 - \sqrt{2}i)(z - 1 + \sqrt{2}i) &= 0 \\z &= 1 \pm \sqrt{2}i\end{aligned}$$

g

Use the quadratic formula.

$$\begin{aligned}z &= \frac{-3 \pm \sqrt{9 - 12}}{2} \\&= \frac{-3 \pm \sqrt{-3}}{2} \\&= \frac{1}{2}(-3 \pm \sqrt{3}i)\end{aligned}$$

h

Use the quadratic formula.

$$\begin{aligned}z &= \frac{-5 \pm \sqrt{25 - 32}}{4} \\&= \frac{-5 \pm \sqrt{-7}}{4} \\&= \frac{1}{4}(-5 \pm \sqrt{7}i)\end{aligned}$$

i

Use the quadratic formula.

$$\begin{aligned}3z^2 - z + 2 &= 0 \\z &= \frac{1 \pm \sqrt{1 - 24}}{6} \\&= \frac{1 \pm \sqrt{-23}}{6} \\&= \frac{1}{6}(1 \pm \sqrt{23}i)\end{aligned}$$

j Complete the square.

$$z^2 - 2z + 5 = 0$$

$$z^2 - 2z + 1 + 4 = 0$$

$$(z - 1)^2 - 4i^2 = 0$$

$$(z - 1 - 2i)(z - 1 + 2i) = 0$$

$$z = 1 \pm 2i$$

k Use the quadratic formula.

$$2z^2 - 6z + 10 = 0$$

$$z^2 - 3z + 5 = 0$$

$$z = \frac{3 \pm \sqrt{9 - 20}}{2}$$

$$= \frac{3 \pm \sqrt{-11}}{2}$$

$$= \frac{1}{2}(3 \pm \sqrt{11}i)$$

l Complete the square.

$$z^2 - 6z + 14 = 0$$

$$z^2 - 6z + 9 + 5 = 0$$

$$(z - 3)^2 - 5i^2 = 0$$

$$(z - 3 - \sqrt{5}i)(z - 3 + \sqrt{5}i) = 0$$

$$z = 3 \pm \sqrt{5}i$$

2 a $(z + 3i)(z - 3i)$

b $(z + \sqrt{3}i)(z - \sqrt{3}i)$

c $3(z + 2i)(z - 2i)$

d $(z + 1 + 2i)(z + 1 - 2i)$

e $\left(z - \frac{3}{2} + \frac{\sqrt{15}}{2}i\right)\left(z - \frac{3}{2} - \frac{\sqrt{15}}{2}i\right)$

f $2\left(z + \frac{1}{2} + \frac{1}{2}i\right)\left(z + \frac{1}{2} - \frac{1}{2}i\right)$