

a)

$$z = a + bi$$

$$a^2 - b^2 + 2abi = 5 + 12i$$

$$|z^2| = |z|^2 = \sqrt{25 + 144} = \sqrt{169} = 13$$

↓  $a^2 + b^2$

$$\begin{cases} 1 & a^2 + b^2 = 13 \\ 2 & a^2 - b^2 = 5 \\ 3 & 2ab = 12 \end{cases} \quad 1+2 \begin{cases} 2a^2 = 18 & a = \pm 3 \\ 2ab = 12 \end{cases}$$

$$a + b^2 = 13 \quad b^2 = 4 \quad b = \pm 2$$

Sv:  $z_1 = 3 + 2i, z_2 = -3 - 2i$

b)

$$z^2 - (2+2i)z - (5+10i) = 0$$

$$(z - (1+i))^2 - (1+i)^2 - 5 - 10i = 0 \Leftrightarrow$$

$$(z - (1+i))^2 = (1+i)^2 + 5 + 10i \Leftrightarrow (z - (1+i))^2 = 2i + 5 + 10i \Leftrightarrow$$

$$\Leftrightarrow \underbrace{(z - (1+i))^2}_w = 5 + 12i \Leftrightarrow w^2 = 5 + 12i$$

$$w = a + bi$$

$$|w^2| = |w|^2 = \sqrt{25 + 144} = 13$$

↓  $a^2 + b^2$

$$a^2 - b^2 + 2abi = 5 + 12i$$

$$\begin{cases} 1 & a^2 - b^2 = 5 \\ 2 & a^2 + b^2 = 13 \\ 3 & 2ab = 12 \end{cases} \quad (1+2) \begin{cases} 2a^2 = 18 & a = \pm 3 \\ 2ab = 12 & b = \pm 2 \end{cases}$$

$$3 + 2i = z - (1+i) \Leftrightarrow z_1 = 4 + 3i$$

$$-3 - 2i = z - (1+i) \Leftrightarrow z_2 = -2 - i$$