Exercice 2 p 84

1. $z^2 + 1 = 0$

$z^2 = -1$

$z = \pm i$

2 $z^2 - 4z + 8 = 0$ $\quad \Delta = b^2 - 4ac = 16 - 4 \times 8 = -16 = (4i)^2$

$x_1 = \dfrac{-b + \sqrt{\Delta}}{2a} = \dfrac{4 + 4i}{2} = 2 + 2i$ $\quad x_2 = \overline{2+2i} = 2 - 2i$

$S = \{2 + 2i ; 2 - 2i\}$

3 $2z^2 + 3z - 5 = 0$ $\quad \Delta = b^2 - 4ac = 9 - 4 \times 2 \times -5 = 49 = 7^2$

$x_1 = \dfrac{-3 + 7}{4} = 1$ $\quad x_2 = \dfrac{-3 - 7}{4} = -\dfrac{5}{2}$

$S = \{1 ; -\frac{5}{2}\}$

4 $-z^2 + 2z - 3 = 0$ $\quad \Delta = b^2 - 4ac = 4 - 4 \times -1 \times -3$

$= -8 = (i2\sqrt{2})^2$

$x_1 = \dfrac{-2 + i2\sqrt{2}}{-2} = 1 - \sqrt{2}\,i$ $\quad x_2 = \overline{x_1} = 1 + \sqrt{2}\,i$ $\quad S = \{1 - \sqrt{2}\,i ; 1 + \sqrt{2}\,i\}$

Exercice 32 p 86

1. $P(z) = z^2 + 4$ $\quad P(z) = 0$

$z = \pm 2i$

$\Rightarrow P(z) = (z - 2i)(z + 2i)$

2. $Q(z) = z^2 - 6z + 25$ $\quad Q(z) = 0$ $\quad \Delta = b^2 - 4ac = 36 - 4 \times 25 \times 1$

$= -64 = (8i)^2$

$x_1 = \dfrac{6 + 8i}{2} = 3 + 4i$ $\quad x_2 = 3 - 4i$

$\Rightarrow Q(z) = (z - 3 - 4i)(z - 3 + 4i)$

3. $R(y) = 2y^2 + 2y + 1$ $\quad R(y)=0 \quad \Delta = b^2 - 4ac$

$= 4 - 4\times 2$

$= -4 = (i2)^2$

$x_1 = \frac{-2+i2}{4} = -\frac{1}{2} + \frac{1}{2}i \qquad x_2 = -\frac{1}{2} - \frac{1}{2}i$

$\Rightarrow R(y) = 2\left(y + \frac{1}{2} - \frac{1}{2}i\right)\left(y + \frac{1}{2} + \frac{1}{2}i\right)$

4. $S(y) = 3y^2 + 5y - 2$ $\quad S(y)=0 \quad \Delta = b^2 - 4ac = 25 - 4\times -2\times 3$

$= 49 = 7^2$

$x_1 = \frac{-5+7}{6} = \frac{1}{3} \qquad x_2 = 2$

$\Rightarrow S(y) = 3\left(y - \frac{1}{3}\right)(y - 2)$