

$$\boxed{1} \quad (1) \quad x^2 - (x-1)(x+3) = x^2 - (x^2 + 2x - 3) = -2x + 3$$

$$(2) \quad x^2 - 81 = (x-9)(x+9)$$

$$(3) \quad x^2 - x - 5 = 0 \text{ よって } x = \frac{1 \pm \sqrt{(-1)^2 - 4 \cdot (-5)}}{2} = \frac{1 \pm \sqrt{21}}{2}$$

$$(4) \quad \sqrt{50} - \frac{4}{\sqrt{2}} = 5\sqrt{2} - \frac{4\sqrt{2}}{2} = 3\sqrt{2}$$

$$(5) \quad y = ax^2. \quad x = 4 \text{ のとき } y = -20 \text{ より } -20 = 16a \text{ よって } a = -\frac{5}{4}, \quad y = -\frac{5}{4}x^2$$

$$\boxed{2} \quad (6) \quad x^2 + x^2 = 6^2 \text{ よって } x = \sqrt{18} = 3\sqrt{2}$$

$$(7) \quad \text{相似比より } 4 : 5 = (4+2) : x \text{ よって } 4x = 5 \cdot 6, \quad x = \frac{15}{2}$$

$$(8) \quad (x-1)(x+2)(x-3) = (x^2 + x - 2)(x-3) = x^3 - 2x^2 - 5x + 6$$

$$(9) \quad x^3 + 9x^2 + 14x = x(x^2 + 9x + 14) = x(x+2)(x+7)$$

$$(10) \quad \frac{1}{2 + \sqrt{5}} + 2 = \frac{2 - \sqrt{5}}{4 - 5} + 2 = -2 + \sqrt{5} + 2 = \sqrt{5}$$

$$\boxed{3} \quad (11) \quad y = -x^2 + 6x = -(x^2 - 6x) = -\{(x-3)^2 - 9\} = -(x-3)^2 + 9 \text{ よって頂点の座標は } (3, 9)$$

$$(12) \quad 2x^2 - x - 1 \leq 0 \text{ よって } (2x+1)(x-1) \leq 0. \quad -\frac{1}{2} \leq x \leq 1$$

$$(13) \quad {}_5P_5 = 5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 120.$$

$$(14) \quad \textcircled{1} \quad \sin^2 \theta = 1 - \cos^2 \theta = 1 - \left(\frac{\sqrt{2}}{5}\right)^2 = \frac{23}{25} \text{ よって } \sin \theta = \frac{\sqrt{23}}{5}$$

$$\textcircled{2} \quad \tan \theta = \frac{\sin \theta}{\cos \theta} = \frac{\frac{\sqrt{23}}{5}}{\frac{\sqrt{2}}{5}} = \frac{\sqrt{23}}{\sqrt{2}} = \frac{\sqrt{46}}{2}$$

$$(15) \quad \textcircled{1} \quad A \cap B = \{6, 9\}$$

$$\textcircled{2} \quad A \cup B = \{1, 2, 3, 6, 7, 8, 9, 10\}$$