kyokuza6.

次の直線, 曲線の式を極方程式で表せ。

(1) $x^2 - y^2 = 2$ (2) $x^2 + 4y^2 = 4$

(3) $x^2 - 4x + y^2 = 0$ (4) $x - y = 4$

(5) $3x + \sqrt{3}y = 6$ (6) $x^2 + (y-2)^2 = 4$

(1) $x = r\cos\theta$ $\quad y = r\sin\theta$ それより

$$r^2(\cos^2\theta - \sin^2\theta) = 2$$

$$\underline{r^2\cos 2\theta = 2} \qquad (1)$$

(2)
$$r^2\cos^2\theta + 4r^2\sin^2\theta = 4$$

$$r^2(\cos^2\theta + 4\sin^2\theta) = 4$$

$$r^2(1 - \sin^2\theta + 4\sin^2\theta) = 4$$

$$r^2(3\sin^2\theta + 1) = 4 \qquad \sin^2\theta = \frac{1-\cos 2\theta}{2}$$

$$r^2\left\{3\left(\frac{1-\cos 2\theta}{2}\right) + 1\right\} = 4 \longrightarrow \underline{r^2(5 - 3\cos 2\theta) = 8} \qquad (2)$$

(3) $r^2\cos^2\theta - 4r\cos\theta + r^2\sin^2\theta = 1$

$$r^2(\cos^2\theta + \sin^2\theta) - 4r\cos\theta = 0$$

$$r^2 - 4r\cos\theta = 0$$

$$r(r - 4\cos\theta) = 0$$

$$r = 0 \text{ or } r = 4\cos\theta \qquad \therefore \underline{r = 4\cos\theta \ (r=0\text{を含む})} \qquad (3)$$

(4) $r\cos\theta - r\sin\theta = 4$

$$r(\cos\theta - \sin\theta) = 4 \qquad \sqrt{2}r\cos\left(\theta + \frac{3}{4}\pi\right) = 4 \qquad \underline{r\cos\left(\theta + \frac{3}{4}\pi\right) = 2\sqrt{2}}$$

$$\qquad (4)$$

(5) $3r\cos\theta + \sqrt{3}r\sin\theta = 6$

$$\sqrt{3}r(\sqrt{3}\cos\theta + \sin\theta) = 6$$

$$2\sqrt{3}r\left\{\cos\left(\theta + \frac{\pi}{3}\right)\right\} = 6$$

$$\sqrt{3}r\cos\left(\theta + \frac{\pi}{3}\right) = 3$$

$$\underline{r\cos\left(\theta + \frac{\pi}{3}\right) = \sqrt{3}} \qquad (5)$$

(6)
$$r^2\cos^2\theta + (r\sin\theta - 2)^2 = 4$$

$$r^2(\cos^2\theta + \sin^2\theta) - 4r\sin\theta + 4 = 4$$

$$r^2 - 4r\sin\theta = 0$$

$$r(r - 4\sin\theta) = 0$$

$$r = 0 \text{ or } r = 4\sin\theta$$

$$\therefore \underline{r = 4\sin\theta \ (r=0\text{を含む})} \qquad (6)$$