

極座標

次の極方程式の表す曲線を、直交座標の x, y の方程式で表せ。

$$(1) r = \frac{1}{3 + \cos \theta}$$

$$(3) r = \frac{4}{2 + \sin \theta}$$

$$(2) r = \frac{2}{1 + 2 \cos \theta}$$

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

1)

$$r(3 + \cos \theta) = 1$$

$$3r + r \cos \theta = 1 \quad x = r \cos \theta \text{ より}$$

$$3r + x = 1$$

$$3r = 1 - x \quad \text{両辺2乗して}$$

$$9r^2 = (1 - x)^2$$

$$9(x^2 + y^2) = (1 - x)^2$$

$$9x^2 + 9y^2 - 1 + 2x - x^2 = 0$$

$$8x^2 + 2x + 9y^2 - 1 = 0$$

2)

$$r(1 + 2 \cos \theta) = 2$$

$$r + 2r \cos \theta = 2$$

$$r + 2x = 2$$

$$r = 2 - 2x$$

$$r^2 = (2 - 2x)^2$$

$$x^2 + y^2 = 4 - 8x + 4x^2$$

$$3x^2 - 8x - y^2 + 4 = 0$$

3)

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

$$2r + r \sin \theta = 4$$

$$2r + y = 4$$

$$2r = 4 - y$$

$$4r^2 = (4 - y)^2$$

$$4(x^2 + y^2) - 16 + 8y - y^2 = 0$$

$$4x^2 + 3y^2 + 8y - 16 = 0$$

4)

$$r(2 - 3 \sin \theta) = 1$$

$$2r - 3r \sin \theta = 1$$

$$2r - 3y = 1$$

$$2r = 1 + 3y$$

$$4r^2 = (1 + 3y)^2$$

$$4(x^2 + y^2) - 1 - 6y - 9y^2 = 0$$

$$4x^2 - 5y^2 - 6y - 1 = 0$$