

1. (1)  $x = x-1$  と  $y = 2x-3$  に代入して  $y = 2(x-1) - 3$   
 $y = 2x - 5$

(2)  $x = x+1$  と  $y = x^2 + 2$  に代入して  $y = (x+1)^2 + 2$   
 $y = x^2 + 2x + 3$

(3)  $y = \sqrt{x-1}$  と  $x = y^2 + 1$  ( $y \geq 0$ )

(4)  $x = \sqrt{1-x^2}$  より  $x \geq 0 \dots \textcircled{1}$   
 また、 $x^2 = 1-x^2$   
 $x^2 = 1-x^2 \geq 0$   
 $x^2 - 1 \leq 0$   
 これより  $-1 \leq x \leq 1 \dots \textcircled{2}$

$x^2 = 1-x^2$  と  $y = x^2 + 1$  に代入  
 $y = -x^2 + 2$   
 $\textcircled{1}, \textcircled{2}$  より  $0 \leq x \leq 1$

(5)  $y = \cos 2\theta$       より  $y = 1 - 2x^2$        $-1 \leq \sin \theta \leq 1$   
 $= 1 - 2\sin^2 \theta$        $(-1 \leq x \leq 1)$       より

(6)  $y = \frac{1}{1+x^2} x = \frac{x}{1+x^2}$   
 $x \neq 0$  とすると  $x = \frac{y}{1-x^2}$   
 これを代入して  
 $x = \frac{1}{1 + \frac{y^2}{x^2}}$

$x = \frac{x^2}{x^2 + y^2}$   
 $x^2 + y^2 = x$   
 $(x - \frac{1}{2})^2 + y^2 = \frac{1}{4}$   
 ただし点  $(0,0)$  を除く

2. (1)  $\cos \theta = \frac{x}{2}$  ,  $\sin \theta = \frac{y}{2}$  と  $\cos^2 \theta + \sin^2 \theta = 1$  に代入  
 $(\frac{x}{2})^2 + (\frac{y}{2})^2 = 1 \longrightarrow x^2 + y^2 = 4$

(2)  $\frac{1}{\cos \theta} = \frac{x}{2}$  ,  $\tan \theta = \frac{y}{3}$  と  $\frac{1}{\cos^2 \theta} - \tan^2 \theta = 1$  に代入  
 $(\frac{x}{2})^2 - (\frac{y}{3})^2 = 1 \longrightarrow \frac{x^2}{4} - \frac{y^2}{9} = 1$

(3)  $\cos \theta = \frac{x-1}{4}$  ,  $\sin \theta = \frac{y+1}{3}$  より  
 $(\frac{x-1}{4})^2 + (\frac{y+1}{3})^2 = 1 \longrightarrow \frac{(x-1)^2}{16} + \frac{(y+1)^2}{9} = 1$

$$3. (1) \left(\frac{x}{4}\right)^2 + \left(\frac{y}{4}\right)^2 = 1$$

$$\text{∴ } x = 4 \cos \theta$$

$$y = 4 \sin \theta$$

$$(2) \left(\frac{x}{5}\right)^2 + \left(\frac{y}{3}\right)^2 = 1$$

$$\text{∴ } x = 5 \cos \theta$$

$$y = 3 \sin \theta$$

$$(3) \left(\frac{x}{2}\right)^2 - y^2 = 1$$

$$\text{∴ } x = \frac{2}{\cos \theta}$$

$$y = \tan \theta$$

$$(4) \left(\frac{x}{2}\right)^2 + \left(\frac{y}{\sqrt{6}}\right)^2 = 1$$

$$\text{∴ } x = 2 \cos \theta$$

$$y = \sqrt{6} \sin \theta$$

$$4. x^2 - y^2 = 1 \quad \text{と} \quad y = x + t \quad \text{を連立}$$

$$x^2 - (x+t)^2 = 1$$

$$x^2 - (x^2 + 2tx + t^2) = 1$$

$$-2tx = t^2 + 1$$

$$x = -\frac{t^2 + 1}{2t}$$

$$y = x + t \quad \text{に代入}$$

$$y = -\frac{t^2 + 1}{2t} + t$$

$$= \frac{-(t^2 + 1) + 2t^2}{2t}$$

$$= \frac{t^2 - 1}{2t}$$

$$\text{∴ } x = -\frac{t^2 + 1}{2t}$$

$$y = \frac{t^2 - 1}{2t}$$