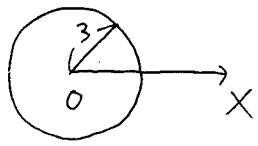
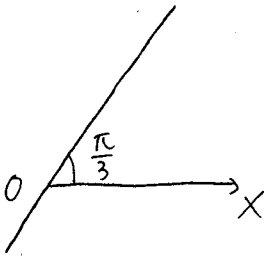
1. (1)



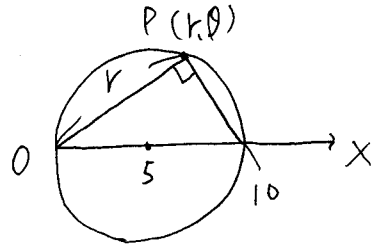
$r = 3$

(2)



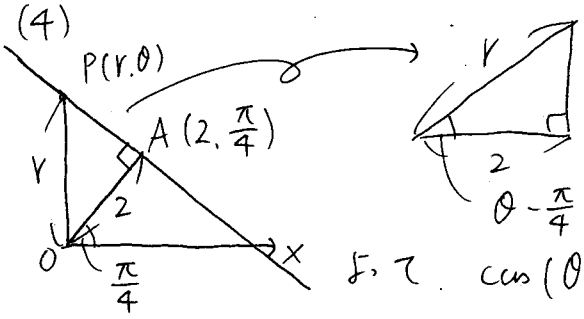
$\theta = \frac{\pi}{3}$

(3)



$r = 10\cos\theta$

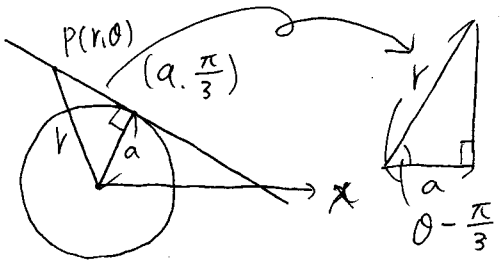
(4)



よって $\cos\left(\theta - \frac{\pi}{4}\right) = \frac{2}{r}$

$r\cos\left(\theta - \frac{\pi}{4}\right) = 2$

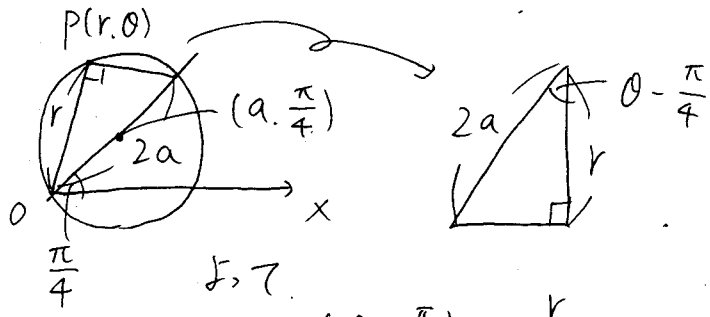
(5)



よって $\cos\left(\theta - \frac{\pi}{3}\right) = \frac{a}{r}$

$r\cos\left(\theta - \frac{\pi}{3}\right) = a$

(6)



よって $\cos\left(\theta - \frac{\pi}{4}\right) = \frac{r}{2a}$

$2a\cos\left(\theta - \frac{\pi}{4}\right) = r$

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

$y = -1$

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

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

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

$x^2 + y^2 + 4x = 0$

(3) $r\sin\left(\theta - \frac{2}{3}\pi\right) = 2$

$r\left(\sin\theta\cos\frac{2}{3}\pi - \cos\theta\cdot\sin\frac{2}{3}\pi\right) = 2$

$-\frac{1}{2}r\sin\theta - \frac{\sqrt{3}}{2}r\cos\theta - 2 = 0$

$-\frac{1}{2}y - \frac{\sqrt{3}}{2}x - 2 = 0$

$\sqrt{3}x + y + 4 = 0$

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

$r^2\cos^2\theta = r\sin\theta$

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

$x^2 = y$

(5) $r^2\cos 2\theta = -1$

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

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

$x^2 - y^2 = -1$

(6) $r^2(4 - 3\cos^2\theta) = 4$

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

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

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

3. (1) $r = \dfrac{1}{\sqrt{2} + \cos\theta}$

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

$r\sqrt{2} + x = 1$

$r\sqrt{2} = 1 - x$

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

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

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

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

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

$\dfrac{(x+1)^2}{2} + y^2 = 1$

(2) $r = \dfrac{3}{1 + 2\cos\theta}$

$r(1 + 2\cos\theta) = 3$

$r + 2x = 3$

$r = 3 - 2x$

$r^2 = (3-2x)^2$

$x^2 + y^2 = 4x^2 - 12x + 9$

$3x^2 - y^2 - 12x + 9 = 0$

$3(x-2)^2 - 12 - y^2 + 9 = 0$

$3(x-2)^2 - y^2 = 3$

$(x-2)^2 - \dfrac{y^2}{3} = 1$