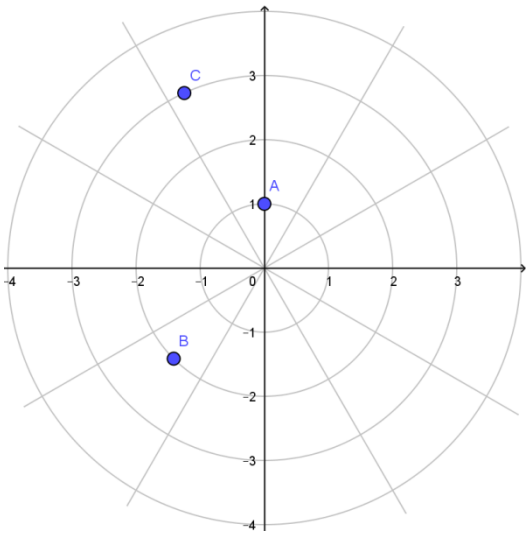
Plot the point whose polar coordinates are given. Then find two other pairs of polar coordinates of this point, one with $r > 0$ and one with $r < 0$.

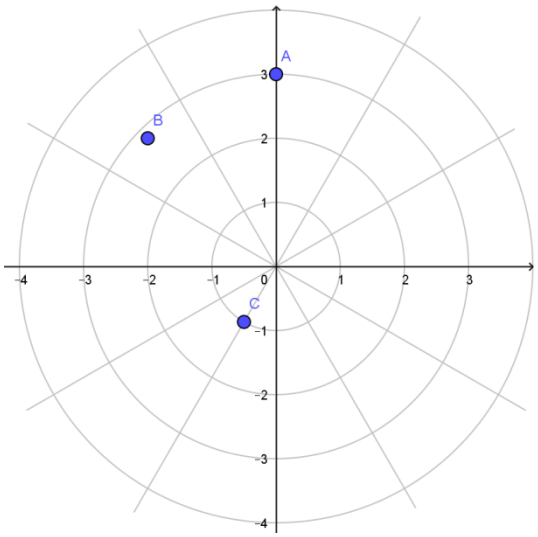
1) (a) $(1, \pi/2)$ (b) $(-2, \pi/4)$ (c) $(3, 2)$



a) $r > 0$: $(1, \frac{5\pi}{2})$ $r < 0$: $(-1, \frac{3\pi}{2})$
b) $r > 0$: $(2, \frac{5\pi}{4})$ $r < 0$: $(-2, \frac{9\pi}{4})$
c) $r > 0$: $(3, 2+2\pi)$ $r < 0$: $(-3, 2+\pi)$

Plot the point whose polar coordinates are given. Then find the Cartesian coordinates of the point.

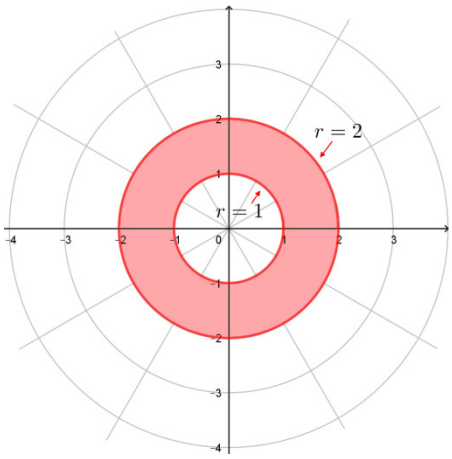
2) (a) $(3, \pi/2)$ (b) $\left(2\sqrt{2}, 3\pi/4\right)$ (c) $(-1, \pi/3)$



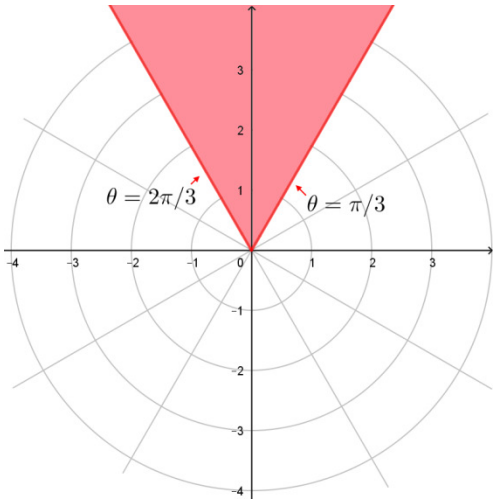
a) $(0, 3)$ b) $(-2, 2)$ c) $\left(-\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$

Sketch the region in the plane consisting of points whose polar coordinates satisfy the given conditions.

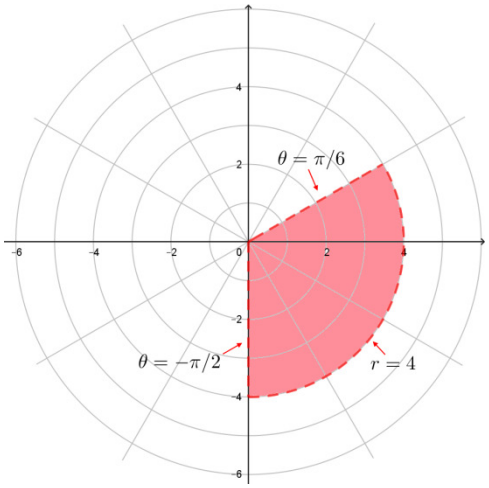
3) $1 \le r \le 2$



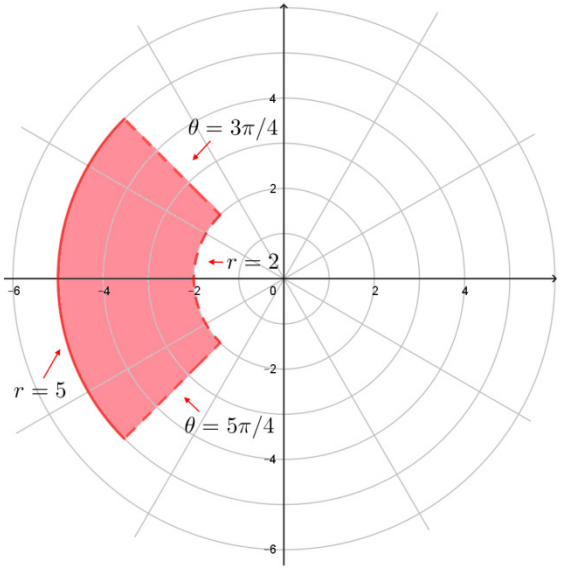
4) $r \ge 0, \quad \frac{\pi}{3} \le \theta \le \frac{2\pi}{3}$



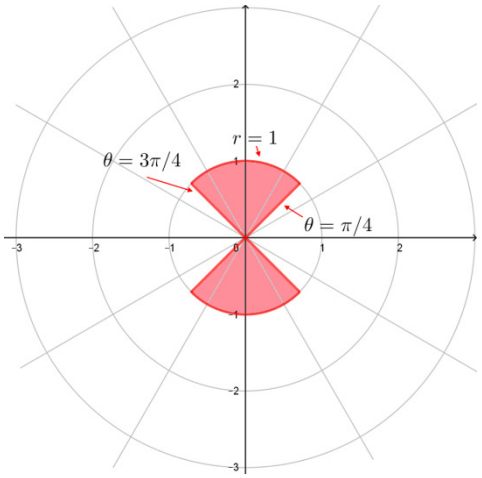
5) $0 \le r < 4, \quad -\frac{\pi}{2} \le \theta \le \frac{\pi}{6}$



6) $2 < r \le 5, \quad \frac{3\pi}{4} < \theta < \frac{5\pi}{4}$



7) $-1 \le r \le 1, \quad \frac{\pi}{4} < \theta < \frac{3\pi}{4}$



Identify the curve by finding a Cartesian equation for the curve.

8) $r = 2$ $\boxed{x^2 + y^2 = 4}$

9) $r\cos\theta = 1$ $\boxed{x = 1}$

10) $r = 2\sin\theta + 2\cos\theta$ $\boxed{(x-1)^2 + (y-1)^2 = 2}$

11) $r = \tan\theta\sec\theta$ $\boxed{x^2 = y}$

Find a polar equation for the curve represented by the given Cartesian equation.

12) $x = 3$ $\boxed{r = 3\sec\theta}$

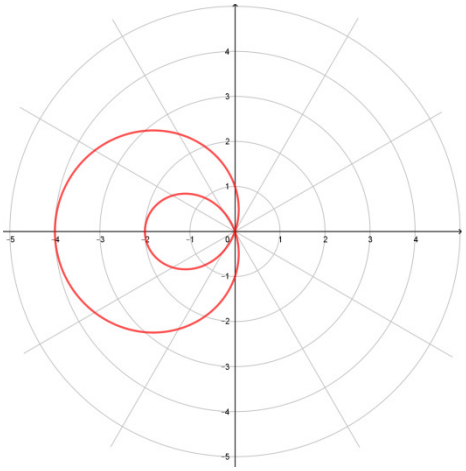
13) $x^2 + y^2 = 9$ $\boxed{r = 3}$

14) $x = -y^2$ $\boxed{r = -\cot\theta\csc\theta}$

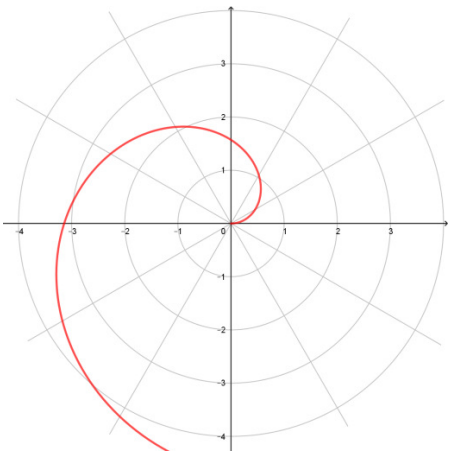
15) $x^2 - y^2 = 1$ $\boxed{r^2 = \sec 2\theta}$

Sketch the curve with the given polar equation.

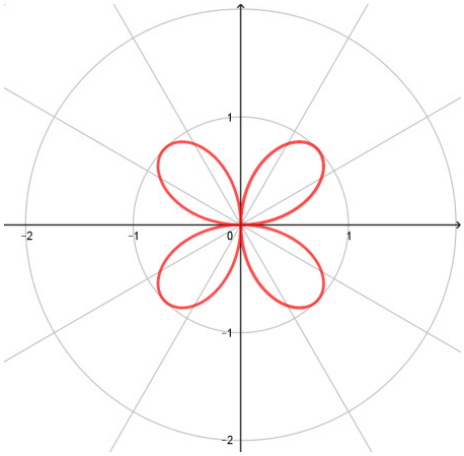
16) $r = 1 - 3\cos\theta$



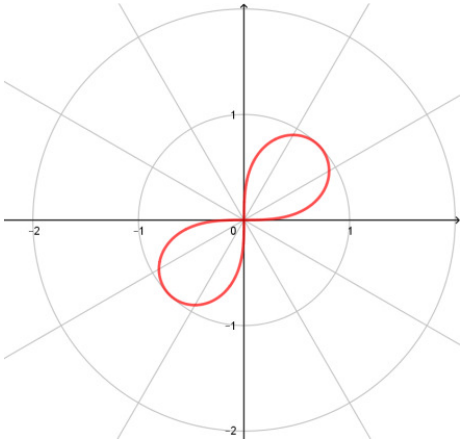
17) $r = \theta, \quad \theta \geq 0$



18) $r = \sin 2\theta$



19) $r^2 = \sin 2\theta$



20) Match the polar equations with the graphs labeled I-VI. Give reasons for your choices. (Don't use a graphing device.)

a) $r = \sin(\theta/2)$ VI

b) $r = \sin(\theta/4)$ III

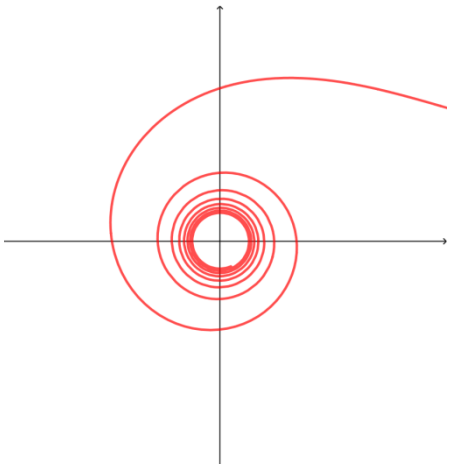
c) $r = \sec(3\theta)$ IV

d) $r = \theta \sin\theta$ V

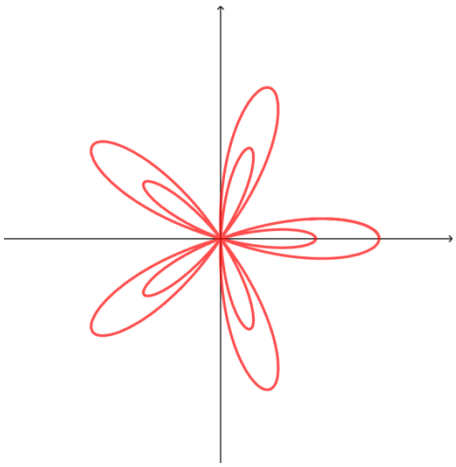
e) $r = 1 + 4\cos 5\theta$ II

f) $r = \dfrac{1}{\sqrt{\theta}}$ I

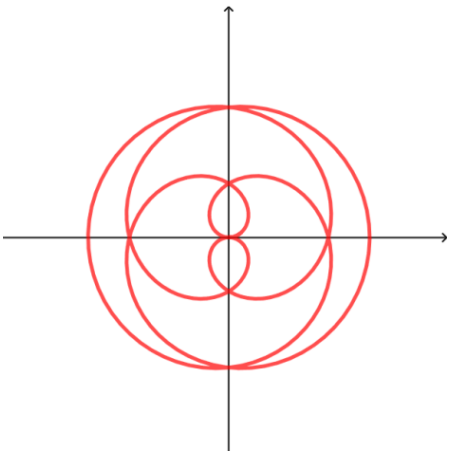
I



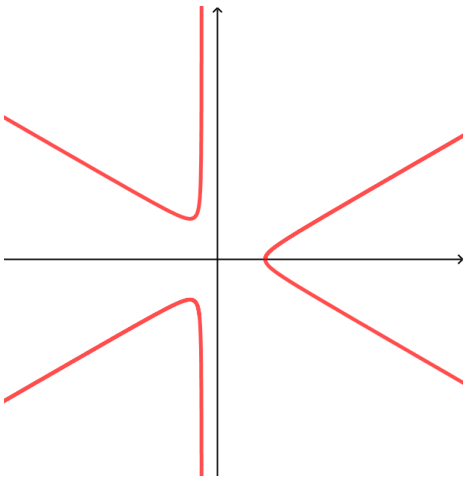
II



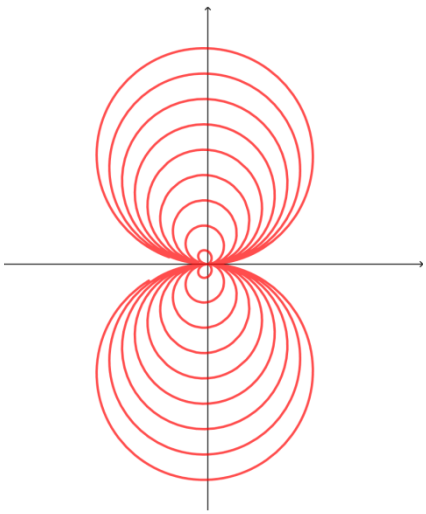
III



IV



V



VI