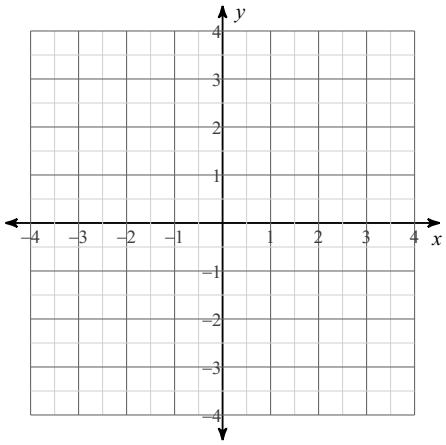
Precalculus Name_____ ID: 1

Review of Polars

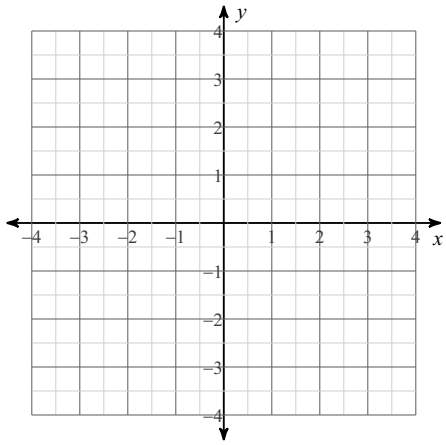
Date_____ Period____

Convert each pair of polar coordinates to rectangular coordinates.

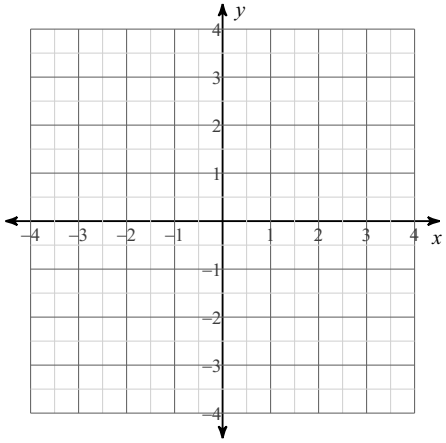
1) (2, 180°)



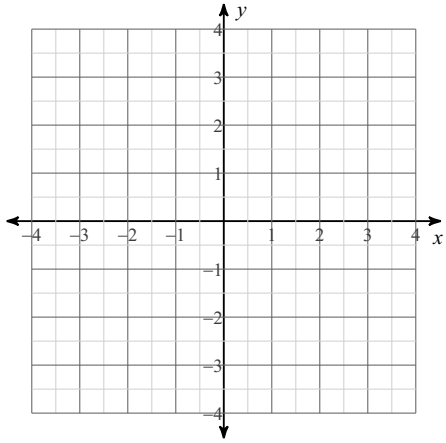
2) (–4, 240°)



3) $\left(-1, -\frac{7\pi}{6}\right)$

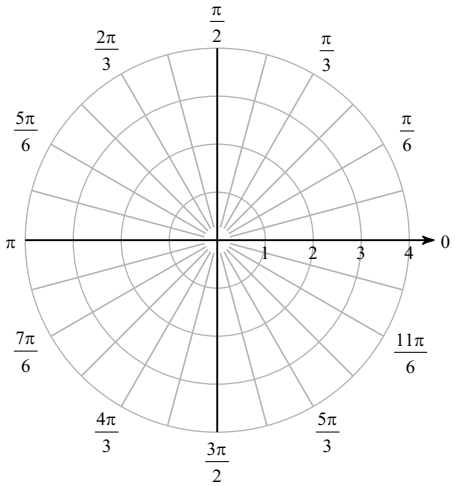


4) $\left(2, -\frac{2\pi}{3}\right)$

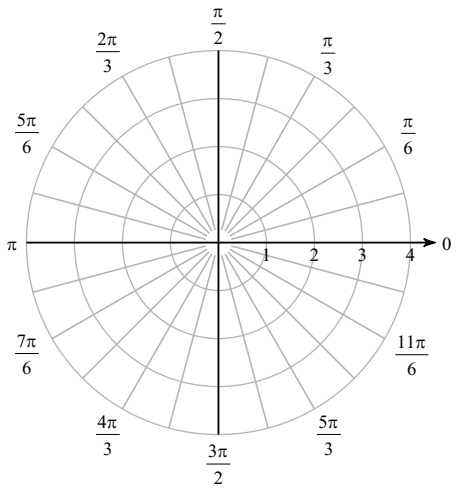


Convert each pair of rectangular coordinates to polar coordinates where $r > 0$ and $0 \le \theta < 2\pi$.

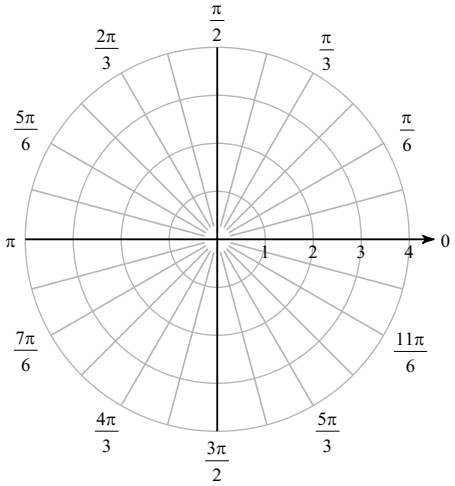
5) $\left(-\frac{3\sqrt{3}}{2}, -\frac{3}{2}\right)$



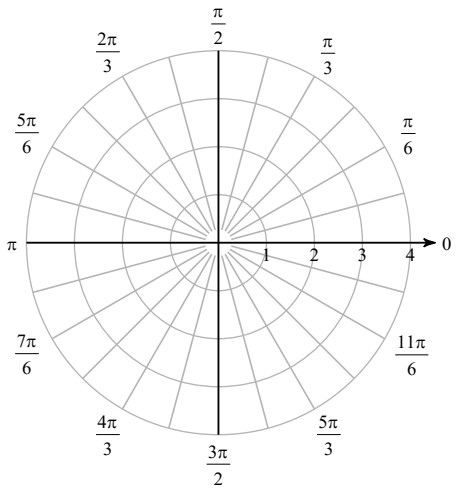
6) $\left(-\sqrt{2}, \sqrt{2}\right)$



7) $\left(\frac{3}{2}, \frac{3\sqrt{3}}{2}\right)$



8) $\left(\sqrt{3}, -1\right)$



Find all pairs of polar coordinates that describe the same point as the provided polar coordinates.

9) (4, 225°)

10) $\left(3, \frac{\pi}{4}\right)$

Convert each equation from rectangular to polar form.

11) $y = \frac{x^2}{3}$

12) $x = \frac{y^2}{4}$

13) $x = \frac{y^2}{3}$

14) $(x-2)^2 + (y+2)^2 = 8$

Convert each equation from polar to rectangular form.

15) $r = 2\cot\theta\csc\theta$

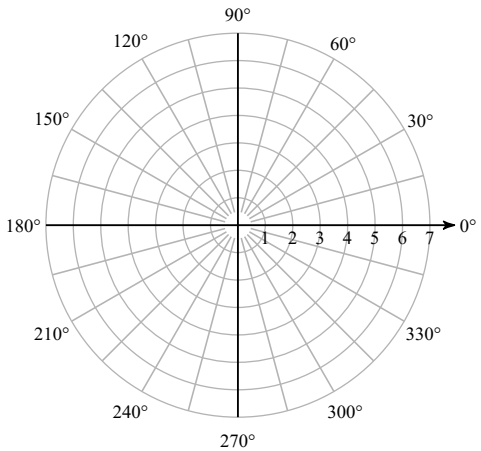
16) $r = -6\cos\theta$

17) $\theta = 45°$

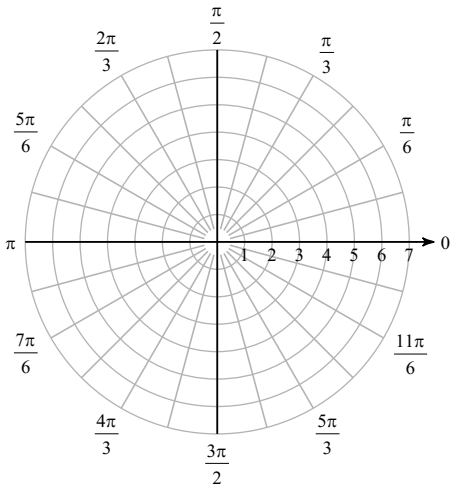
18) $\cot\theta = 4$

Consider each polar equation over the given interval. Classify the curve; determine if the graph is symmetric with respect to the origin, polar axis, and line θ=π/2; find the values of θ where r is zero; find the maximum $|r|$ value and the values of θ where this occurs; and sketch the graph.

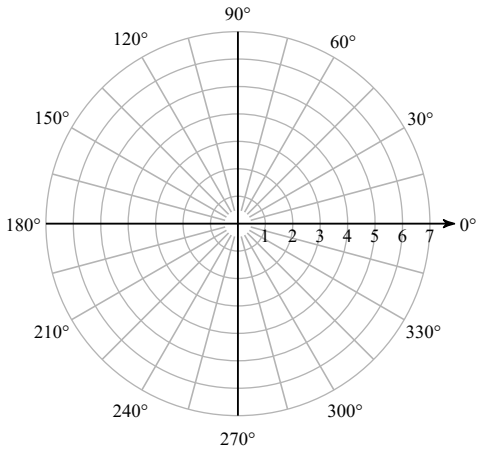
19) $r = 3,\ 0° \le \theta < 360°$



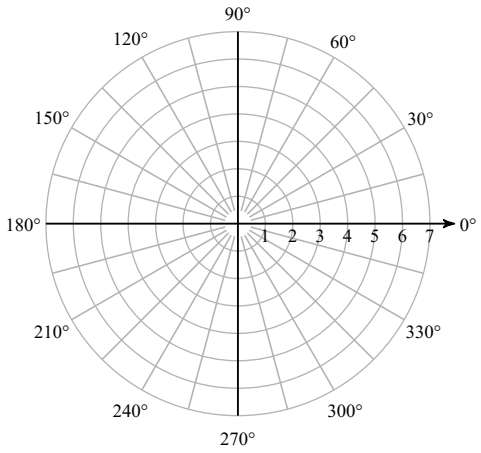
20) $r = 7\cos(2\theta),\ 0 \le \theta < 2\pi$



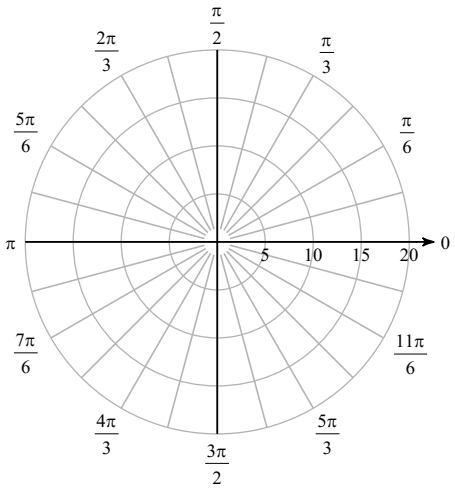
21) $r = 2\cos(5\theta),\ 0° \le \theta < 180°$



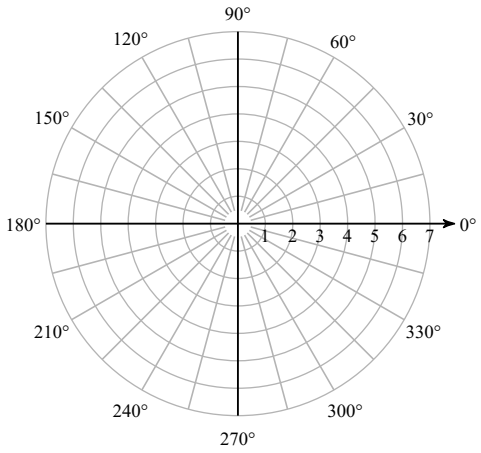
22) $r = 2\sin\theta,\ 0° \le \theta < 180°$



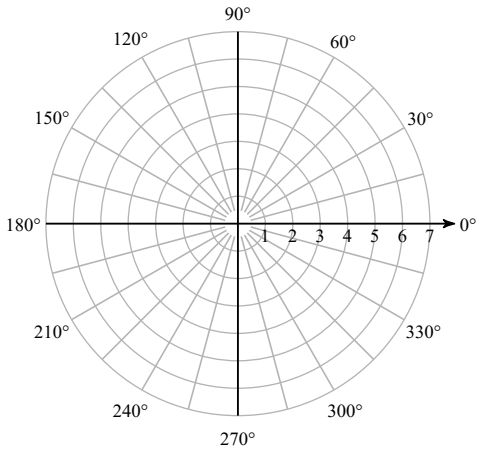
23) $r = 2\theta,\ \theta > 0$



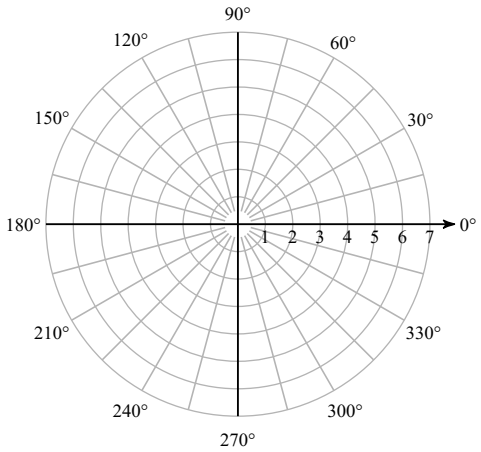
24) $r = 3 + 3\cos\theta,\ 0° \le \theta < 360°$



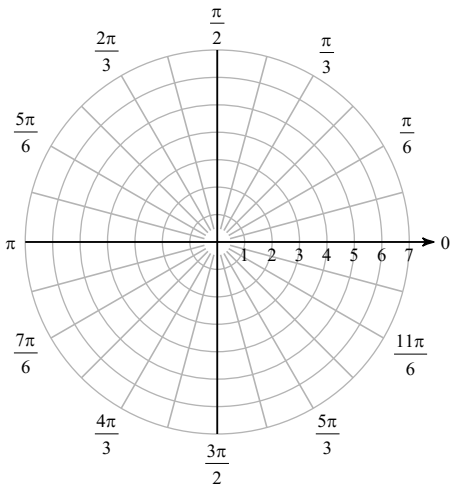
25) $r = 5\cos(3\theta),\ 0° \le \theta < 180°$



26) $r = 1 - 2\sin\theta,\ 0° \le \theta < 360°$

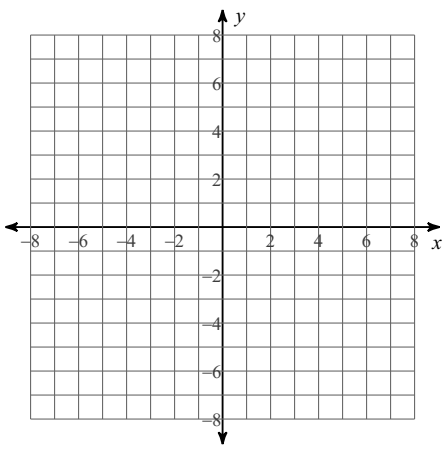


27) $r = 5 + 2\sin\theta,\ 0 \le \theta < 2\pi$

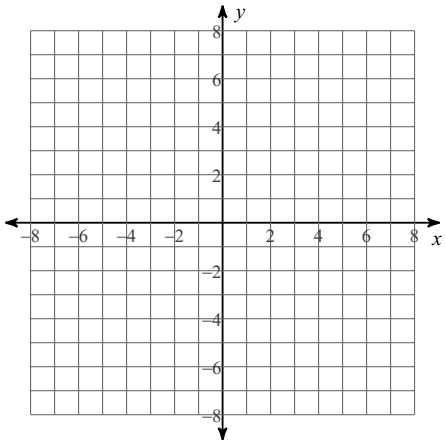


Write each pair of parametric equations in rectangular form. State any restrictions on the domain. Then sketch the curve.

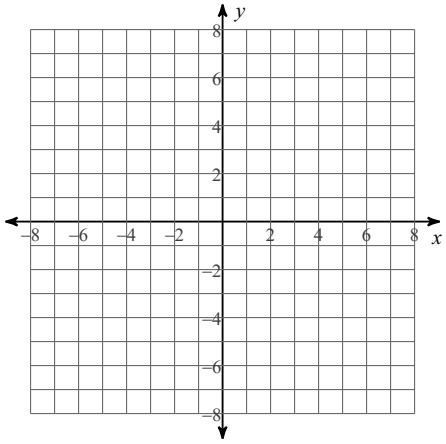
28) $x = \sqrt{6t - 2},\ y = -t + \frac{1}{3}$



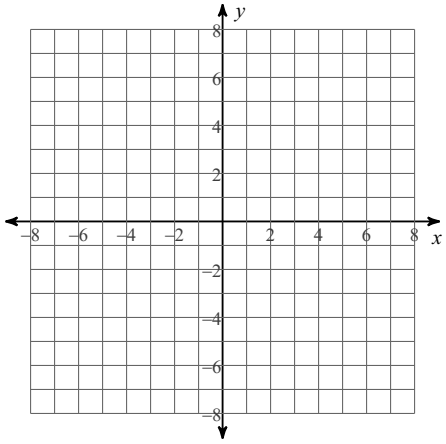
29) $x = t,\ y = \frac{t^2}{2} + 2t + 1,\ -5 \le t \le 1$



30) $x = -3t + 3,\ y = -\frac{9t^2}{4} + \frac{9t}{2} - \frac{9}{4},\ 0 \le t \le 2$



31) $x = t,\ y = -\frac{t^2}{4} + t,\ -3 \le t \le 6$



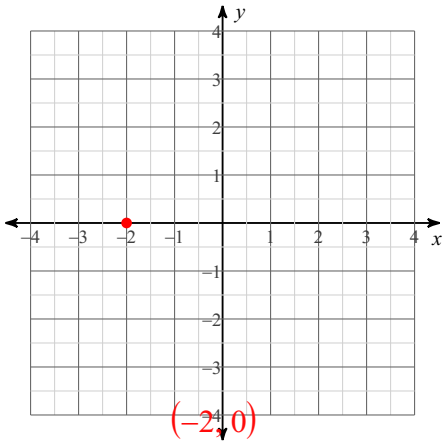
Precalculus Name_____ ID: 1

Review of Polars

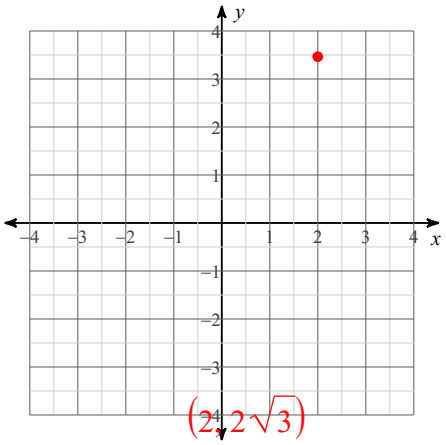
Date_____ Period____

Convert each pair of polar coordinates to rectangular coordinates.

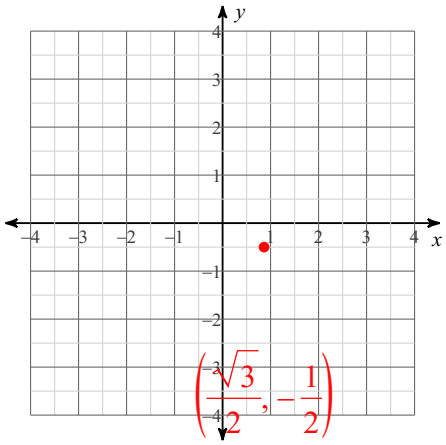
1) (2, 180°)



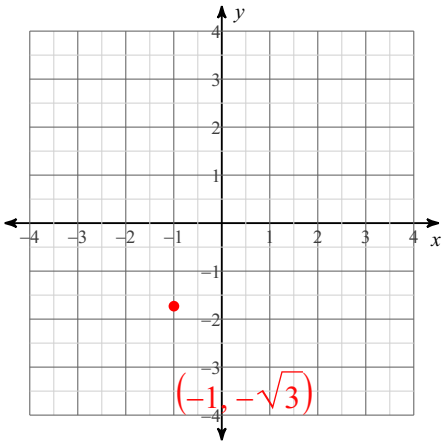
2) (−4, 240°)



3) $\left(-1, -\frac{7\pi}{6}\right)$

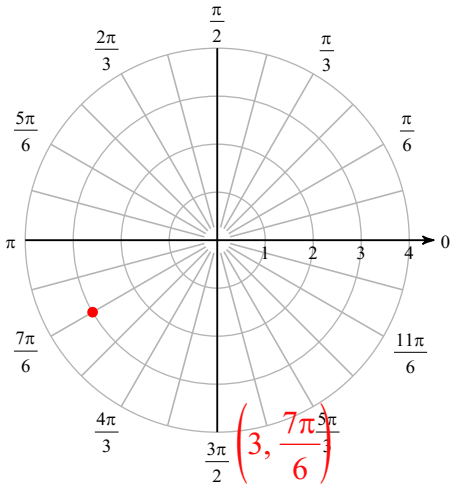


4) $\left(2, -\frac{2\pi}{3}\right)$

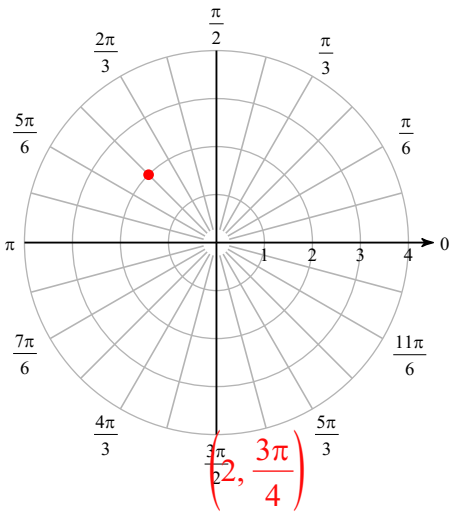


Convert each pair of rectangular coordinates to polar coordinates where $r > 0$ and $0 \le \theta < 2\pi$.

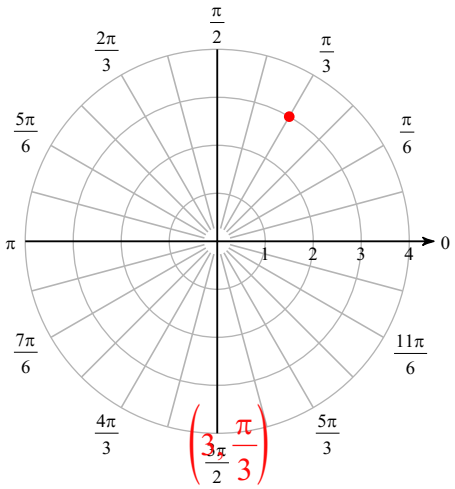
5) $\left(-\frac{3\sqrt{3}}{2}, -\frac{3}{2}\right)$



6) $(-\sqrt{2}, \sqrt{2})$

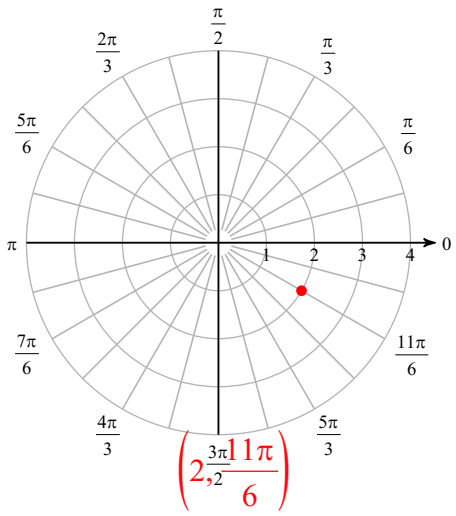


7) $\left(\frac{3}{2}, \frac{3\sqrt{3}}{2}\right)$



$\left(3, \frac{\pi}{3}\right)$

8) $\left(\sqrt{3}, -1\right)$



$\left(2, \frac{11\pi}{6}\right)$

Find all pairs of polar coordinates that describe the same point as the provided polar coordinates.

9) $(4, 225°)$ $(4, 225° + 360n°)$ and $(-4, 45° + 360n°)$ where n is an integer

10) $\left(3, \frac{\pi}{4}\right)$ $\left(3, \frac{\pi}{4} + 2n\pi\right)$ and $\left(-3, \frac{\pi}{4} + (2n+1)\pi\right)$ where n is an integer

Convert each equation from rectangular to polar form.

11) $y = \frac{x^2}{3}$ $r = 3\tan\theta\sec\theta$

12) $x = \frac{y^2}{4}$ $r = 4\cot\theta\csc\theta$

13) $x = \frac{y^2}{3}$ $r = 3\cot\theta\csc\theta$

14) $(x-2)^2 + (y+2)^2 = 8$ $r = 4\cos\theta - 4\sin\theta$

Convert each equation from polar to rectangular form.

15) $r = 2\cot\theta\csc\theta$ $x = \frac{y^2}{2}$

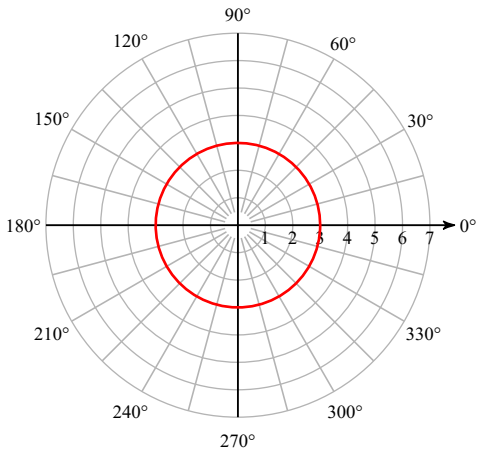
16) $r = -6\cos\theta$ $(x+3)^2 + y^2 = 9$

17) $\theta = 45°$ $y = x$

18) $\cot\theta = 4$ $y = \frac{x}{4}$

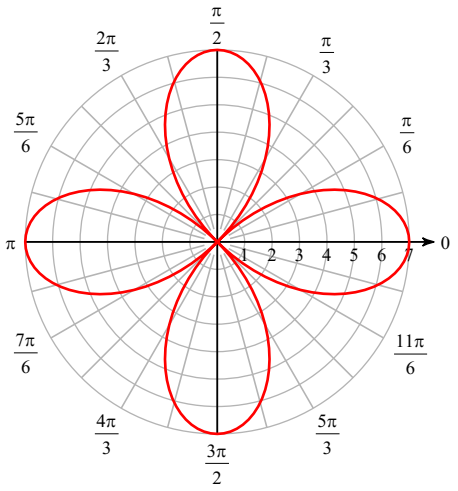
Consider each polar equation over the given interval. Classify the curve; determine if the graph is symmetric with respect to the origin, polar axis, and line θ=π/2; find the values of θ where r is zero; find the maximum $|r|$ value and the values of θ where this occurs; and sketch the graph.

19) $r = 3, 0° \le \theta < 360°$



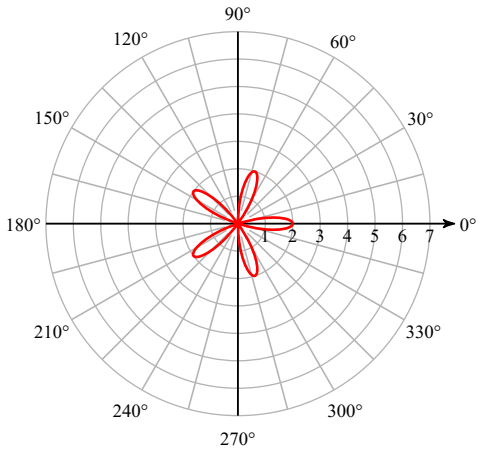
Circle
Symmetric about the origin, polar axis, and line $\theta = 180°$
No values of θ where $r = 0$
$|r| = 3$ for all θ

20) $r = 7\cos(2\theta),\ 0 \le \theta < 2\pi$



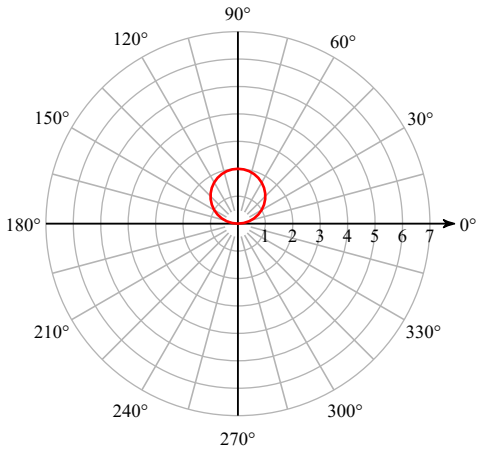
Rose
Symmetric about the origin,
polar axis, and line $\theta = \frac{\pi}{2}$
$r = 0$ when $\theta = \left\{\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}\right\}$
$|r| = 7$ when $\theta = \left\{0, \frac{\pi}{2}, \pi, \frac{3\pi}{2}\right\}$

21) $r = 2\cos(5\theta),\ 0° \le \theta < 180°$



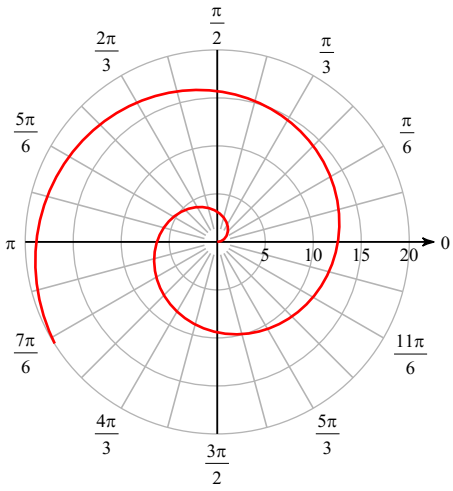
Rose
Symmetric about the polar axis
$r = 0$ when $\theta = \{18°, 54°, 90°, 126°, 162°\}$
$|r| = 2$ when $\theta = \{0, 36°, 72°, 108°, 144°\}$

22) $r = 2\sin\theta,\ 0° \le \theta < 180°$



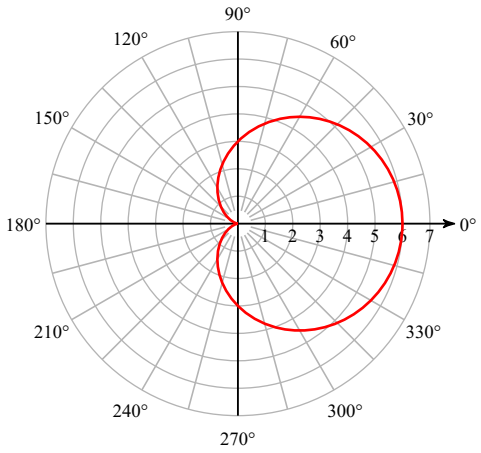
Circle
Symmetric about the line $\theta = 180°$
$r = 0$ when $\theta = \{0\}$
$|r| = 2$ when $\theta = \{90°\}$

23) $r = 2\theta,\ \theta > 0$



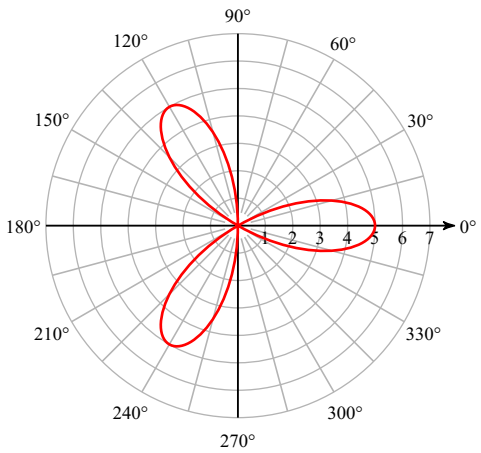
Spiral of Archimedes
Not symmetric about the origin, polar axis, or line $\theta = \frac{\pi}{2}$
$r = 0$ when $\theta = \{0\}$
No maximum $|r|$

24) $r = 3 + 3\cos\theta,\ 0° \le \theta < 360°$



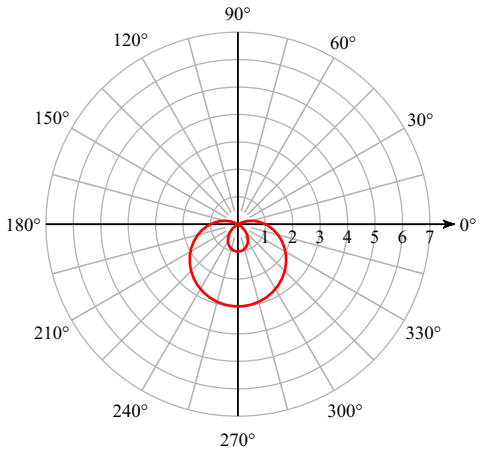
Cardioid (Limaçon)
Symmetric about the polar axis
$r = 0$ when $\theta = \{180°\}$
$|r| = 6$ when $\theta = \{0\}$

25) $r = 5\cos(3\theta),\ 0° \le \theta < 180°$



Rose
Symmetric about the polar axis
$r = 0$ when $\theta = \{30°, 90°, 150°\}$
$|r| = 5$ when $\theta = \{0, 60°, 120°\}$

26) $r = 1 - 2\sin\theta,\ 0° \le \theta < 360°$



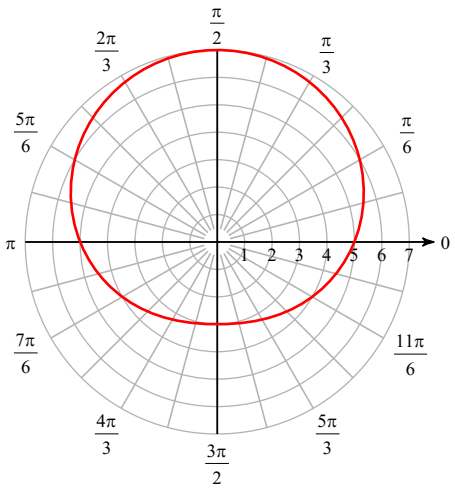
Looped limaçon

Symmetric about the line $\theta = 180°$

$r = 0$ when $\theta = \{30°, 150°\}$

$|r| = 3$ when $\theta = \{270°\}$

27) $r = 5 + 2\sin\theta,\ 0 \le \theta < 2\pi$



Convex limaçon

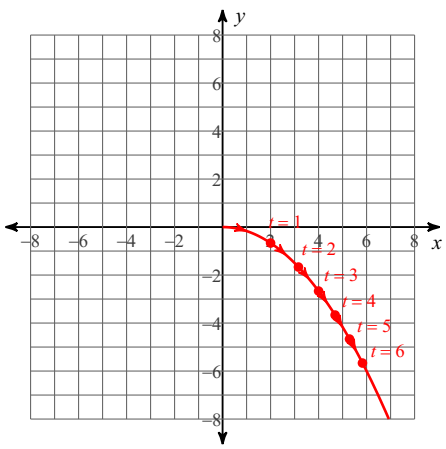
Symmetric about the line $\theta = \dfrac{\pi}{2}$

No values of θ where $r = 0$

$|r| = 7$ when $\theta = \left\{\dfrac{\pi}{2}\right\}$

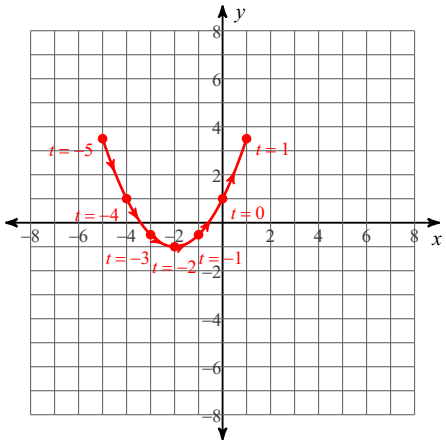
Write each pair of parametric equations in rectangular form. State any restrictions on the domain. Then sketch the curve.

28) $x = \sqrt{6t - 2},\ y = -t + \dfrac{1}{3}$



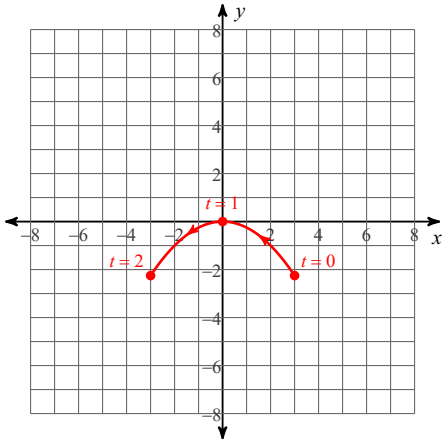
$y = -\dfrac{x^2}{6},\ x \ge 0$

29) $x = t,\ y = \dfrac{t^2}{2} + 2t + 1,\ -5 \le t \le 1$



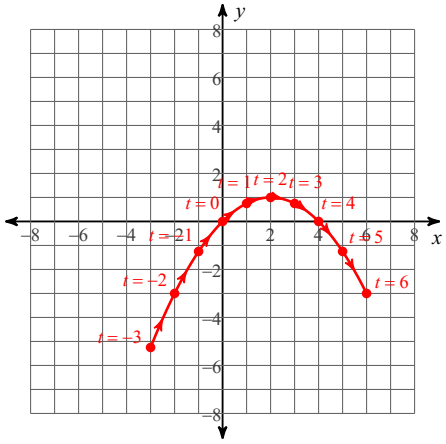
$y = \dfrac{x^2}{2} + 2x + 1,\ -5 \le x \le 1$

30) $x = -3t + 3,\ y = -\dfrac{9t^2}{4} + \dfrac{9t}{2} - \dfrac{9}{4},\ 0 \le t \le 2$



$y = -\dfrac{x^2}{4},\ -3 \le x \le 3$

31) $x = t,\ y = -\dfrac{t^2}{4} + t,\ -3 \le t \le 6$



$y = -\dfrac{x^2}{4} + x,\ -3 \le x \le 6$