

Warm up

1. Find the parametric equation and sketch for:

a.  $x = 2 \cos t$        $y = 3 \sin t$   
 $D: (-\infty, \infty)$     $R: [-2, 2]$     $D: (-\infty, \infty)$     $R: [-3, 3]$

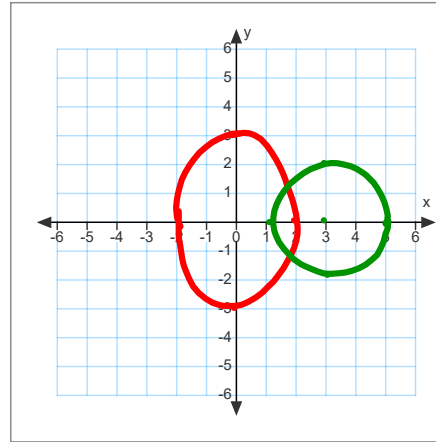
$\frac{x^2}{4} + \frac{y^2}{9} = 1$

$D: [-2, 2]$     $R: [-3, 3]$

b.  $x = 3 + 2 \cos t$        $y = -2 \sin t$   
 $D: [1, 5]$        $R: [-2, 2]$

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

$(x-3)^2 + y^2 = 4$        $D: [1, 5]$     $C: (3, 0)$   
 $R: [-2, 2]$




2. If one set of parameters is  $x = t, y = 3t + 2$ , name another set of parameters that makes a different plane curve.

$x = t$        $y = 3t^2 + 2$   
 $D: (-\infty, \infty)$     $D: (-\infty, \infty)$   
 $R: (-\infty, \infty)$     $R: [2, \infty)$

Apr 23-9:03 AM

**GO COUGARS!**



p 777 **Homework Questions**

In Exercises 29–36, use the results of Exercises 25–28 to find a set of parametric equations for the line or conic.

29. Line: passes through (0, 0) and (6, -3)  
 30. Line: passes through (2, 3) and (6, -3)  
 31. Circle: center: (3, 2); radius: 4  
 32. Circle: center: (-3, 2); radius: 5  
 33. Ellipse: vertices: (±4, 0); foci: (±3, 0)  
 34. Ellipse: vertices: (4, 7), (4, -3); foci: (4, 5), (4, -1)  
 35. Hyperbola: vertices: (±4, 0); foci: (±5, 0)  
 36. Hyperbola: vertices: (±2, 0); foci: (±4, 0)

Sketch the curve represented by the parametric equations. Eliminate the parameter and write the corresponding rectangular equation. State the domain and range of the curve.

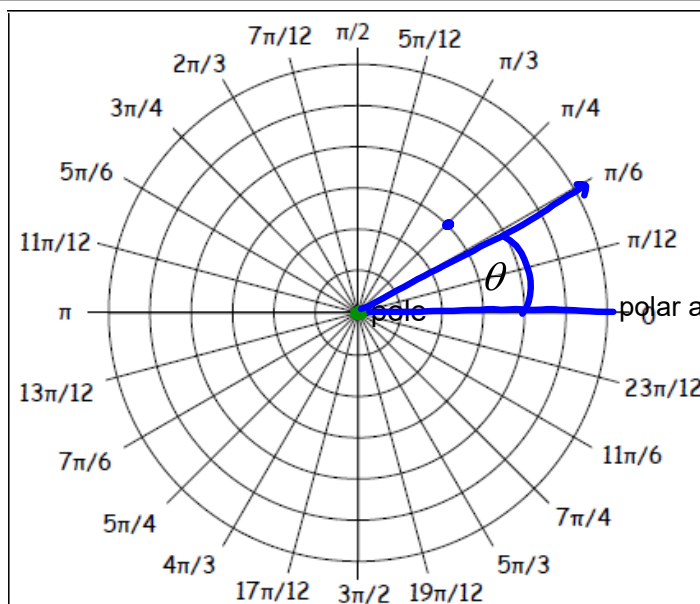
1. $x = 1 + t$ $y = t$	11. $x = \sqrt{t}$ $y = \sqrt{t}$
2. $x = 2t - 3$ $y = 9 - 4t$	12. $x = \sqrt{t}$ $y = 1 - t$
3. $x = 4 \sin t$ $y = 4 \cos t$	13. $x = \sqrt[3]{t}$ $y = 1 - t$
4. $x = t + 2$ $y = \frac{2}{t}$	14. $x = t + 1$ $y = t^2$
5. $x = 4t - 2$ $y = 8t^2$	15. $x = t + 1$ $y = t^3$
6. $x = t - 3$ $y = \sqrt{t - 2}$	16. $x = \sqrt{1 - t}$ $y = \sqrt{t}$
7. $x = 4 \cos t$ $y = 8 \sin t$	17. $x = \sqrt{1 - t^2}$ $y = t$
8. $x = 5 - 3t$ $y = 2 + t$	18. $x = \cos t$ $y = 3 \sin t$
9. $x = 3t - 1$ $y = t^2 + 2$	19. $x = -\sqrt{1 - t}$ $y = -\sqrt{t}$
10. $x =  t $ $y = t$	20. $x = 2 + \sin t$ $y = 3 + \cos t$
	21. $x = e^t$ $y = e^{2t}$

Feb 2-9:51 PM

## 10.7 Polar Coordinates

What is a polar coordinate?  
 Graphing polar coordinates  
 Rectangular points to polar points  
 Polar points to rectangular points

Apr 19-9:28 AM



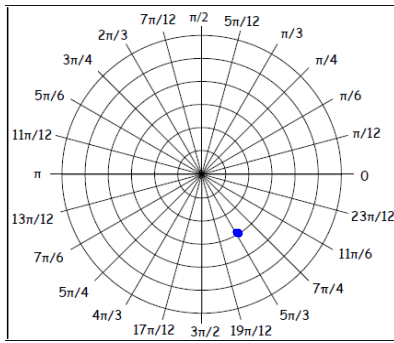
$$P = (r, \theta)$$

$$P = (3, \frac{\pi}{4})$$

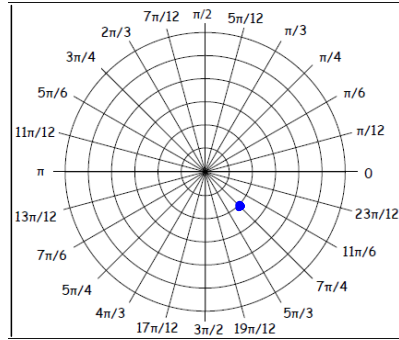
Apr 19-9:35 AM

Plot the points

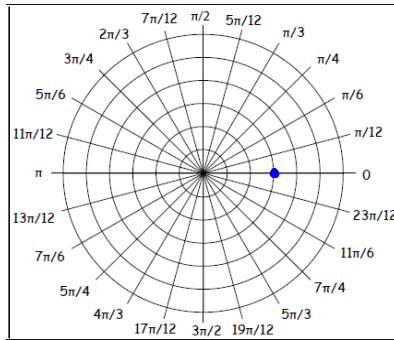
$$\left(3, \frac{5\pi}{3}\right)$$



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

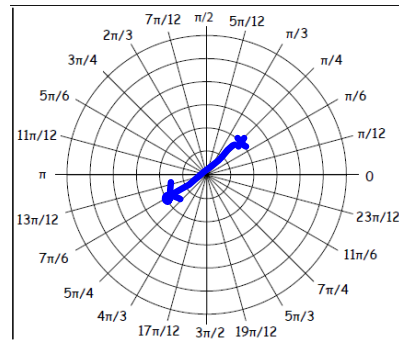


$$(3, 0)$$

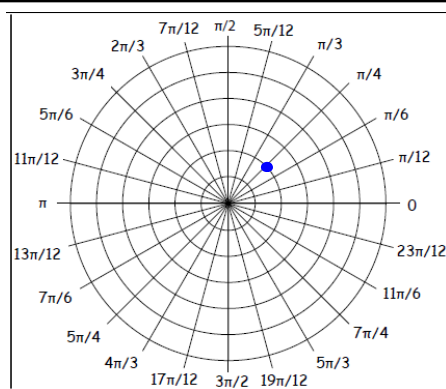


$$\left(-2, \frac{\pi}{4}\right)$$

Flip over the pole to opposite quadrant



Apr 19-9:41 AM



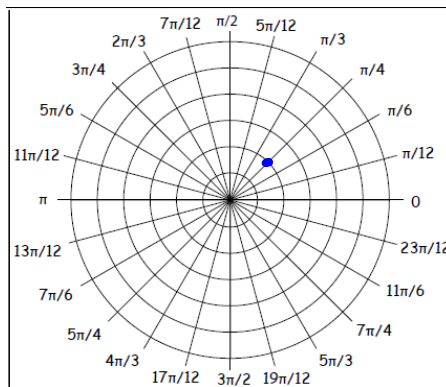
other names for point P

$$P = \left(2, \frac{\pi}{4}\right)$$

$$r < 0 \quad [0, 2\pi] \quad \left(-2, \frac{5\pi}{4}\right)$$

$$r > 0 \quad [2\pi, 4\pi] \quad \left(2, \frac{\pi}{4} + \frac{2\pi}{1}\right) = \left(2, \frac{9\pi}{4}\right)$$

$$r > 0 \quad [-2\pi, 0] \quad \left(2, \frac{\pi}{4} - \frac{2\pi}{1}\right) = \left(2, -\frac{7\pi}{4}\right)$$



$$P = \left(-2, \frac{5\pi}{4}\right)$$

$$\left. \begin{array}{l} r > 0 \quad [-2\pi, 0] \\ r > 0 \end{array} \right\} \begin{array}{l} \left(2, \frac{\pi}{4}\right) \\ \left(2, -\frac{7\pi}{4}\right) \end{array}$$

Apr 23-10:30 AM

Find other polar coordinates for  $\left(3, \frac{\pi}{6}\right)$  when:

1.  $r > 0, 2\pi \leq \theta < 4\pi$

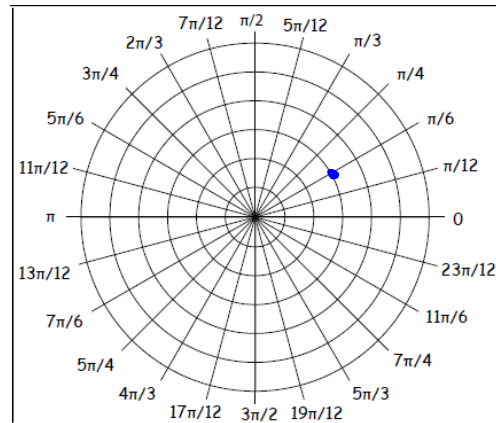
$$\left(3, \frac{13\pi}{6}\right)$$

2.  $r < 0, 0 \leq \theta < 2\pi$

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

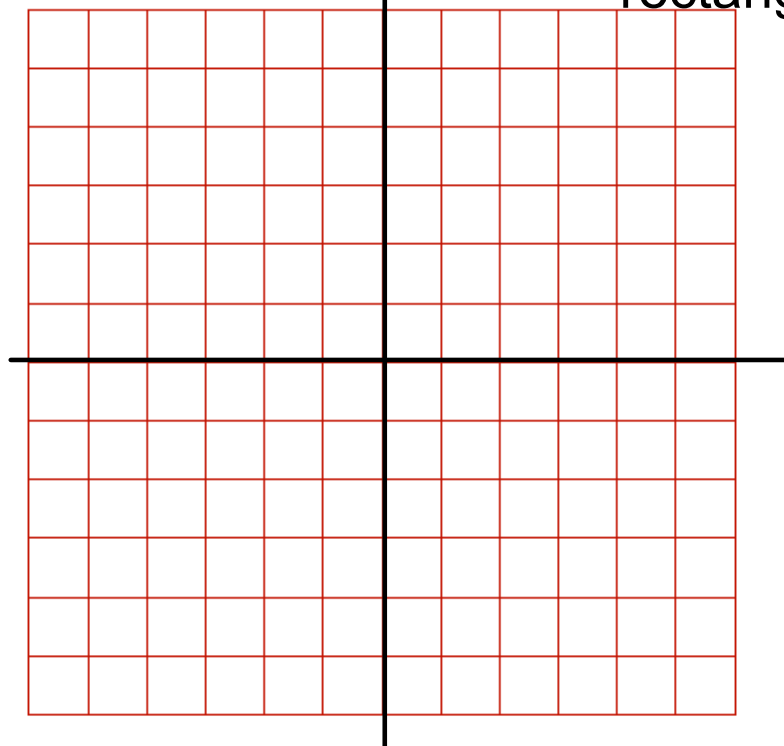
3.  $r > 0, -2\pi \leq \theta < 0$

$$\left(3, -\frac{11\pi}{6}\right)$$

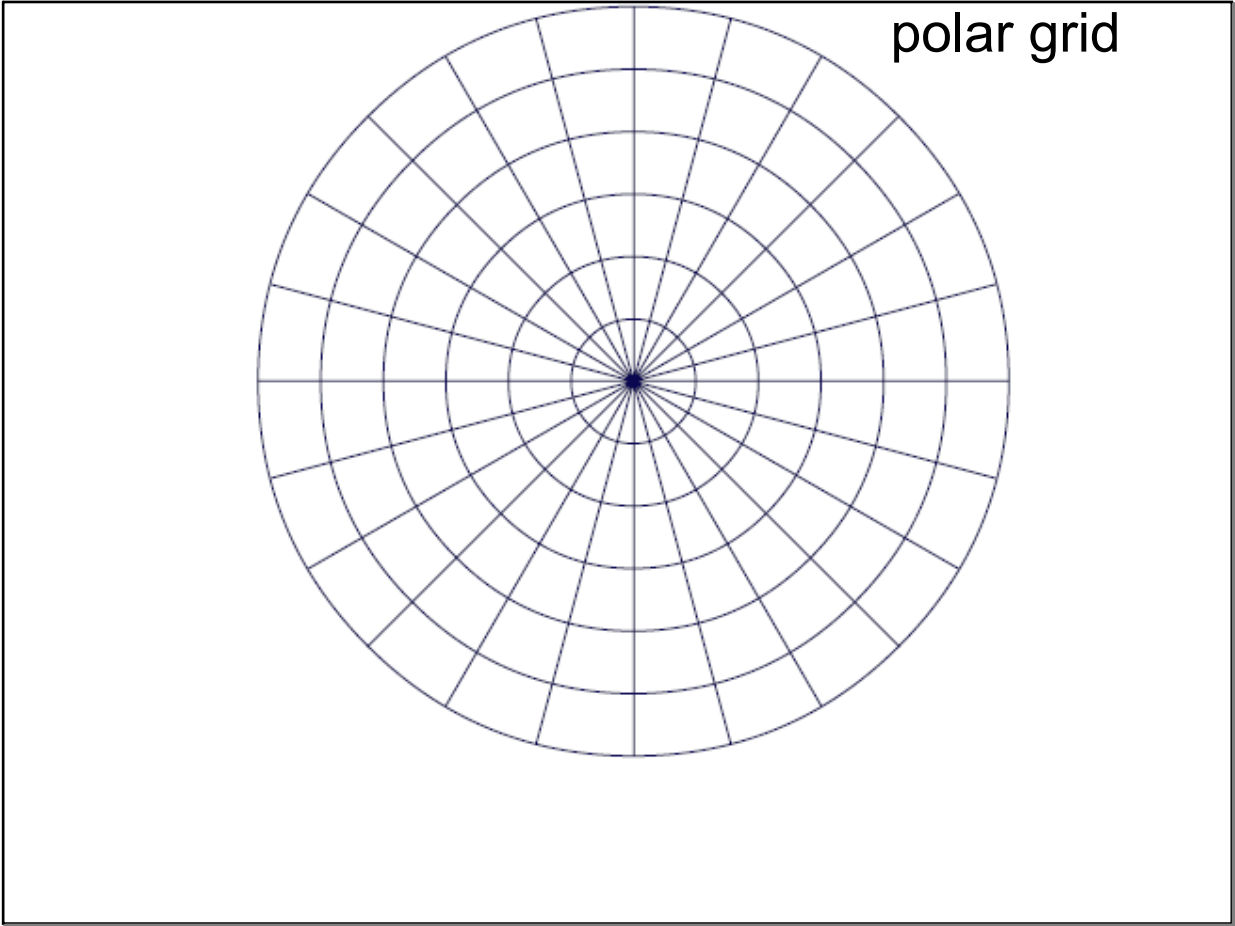


Apr 19-9:44 AM

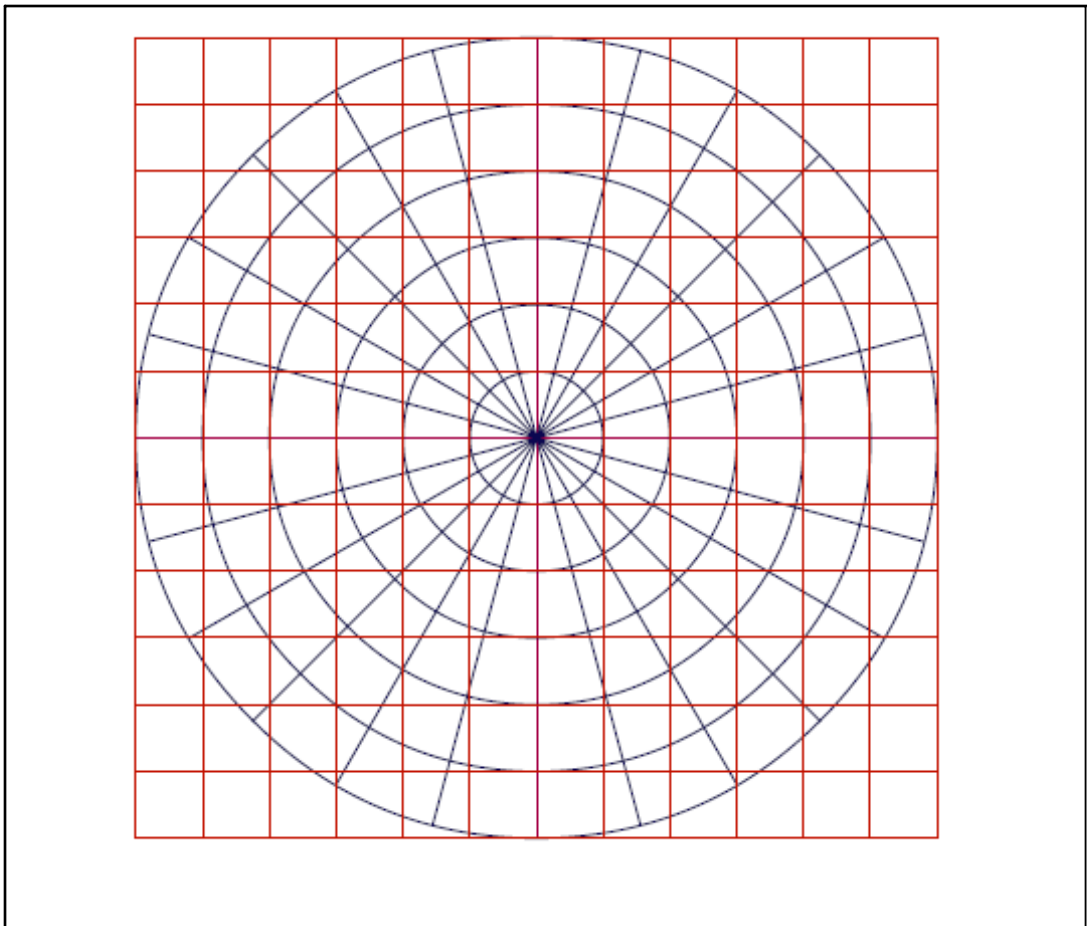
rectangular grid



May 14-7:45 AM



May 14-7:45 AM



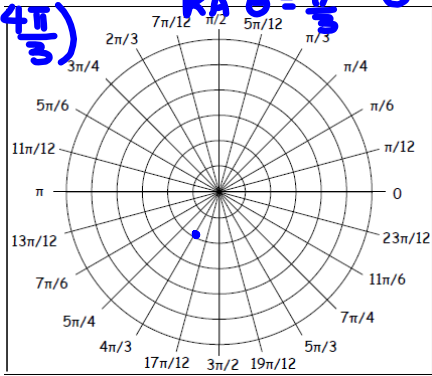
May 14-7:45 AM

### Convert from Rectangular points in terms of (x, y) to Polar points in terms of (r, $\theta$ ):

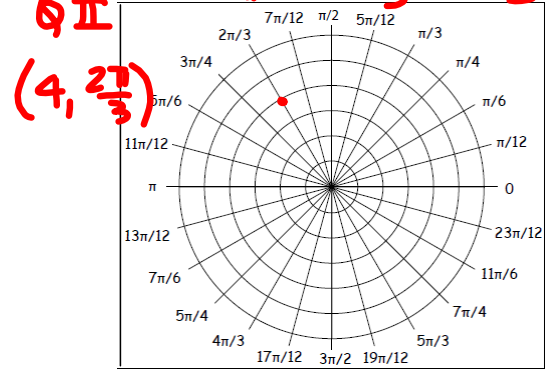
remember that:  $r = \sqrt{x^2 + y^2}$

$$\tan \theta = \frac{y}{x}$$

Q III  
 $(-1, -\sqrt{3})$   
 $r = \sqrt{1 + 3} = 2$   
 $\tan \theta = \frac{-\sqrt{3}}{-1} = \sqrt{3}$   
 RA  $\theta = \frac{\pi}{3}$   
 $\theta = \frac{4\pi}{3}$   
 $(2, \frac{4\pi}{3})$



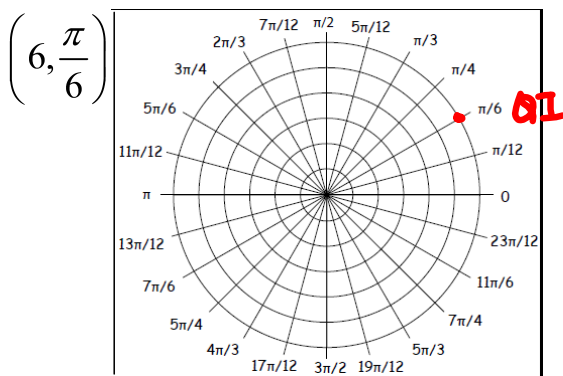
Q II  
 $(-2, 2\sqrt{3})$   
 $r = \sqrt{4 + 12} = 4$   
 $\tan \theta = \frac{2\sqrt{3}}{-2} = -\sqrt{3}$   
 RA  $\theta = \frac{\pi}{3}$   
 $\theta = \frac{2\pi}{3}$   
 $(4, \frac{2\pi}{3})$



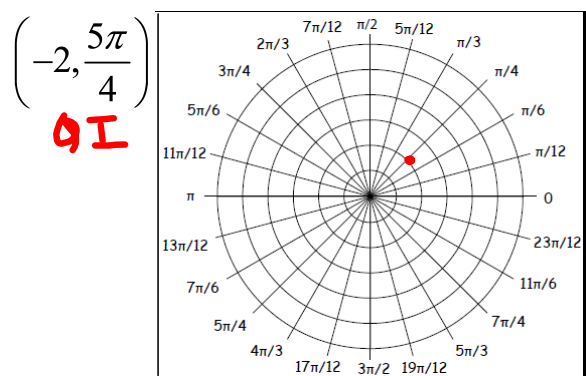
Apr 19-9:47 AM

### Convert from polar to rectangular form:

$$x = r \cos \theta \quad y = r \sin \theta \quad (\text{look familiar?})$$



$(6 \cos \frac{\pi}{6}, 6 \sin \frac{\pi}{6})$   
 $(6(\frac{\sqrt{3}}{2}), 6(\frac{1}{2}))$   
 $(3\sqrt{3}, 3)$



$(-2 \cos \frac{5\pi}{4}, -2 \sin \frac{5\pi}{4})$   
 $(-2(-\frac{1}{2}), -2(-\frac{1}{2}))$   
 $(\frac{1}{2}, \frac{1}{2})$

Apr 19-9:45 AM

## Non-common angles - calc only!

polar to rectangular

$$(5, 177^\circ)$$

Use  $x = r \cos \theta$   
 $y = r \sin \theta$

$$(5 \cos 177, 5 \sin 177)$$

$$(-4.99, 0.26)$$

rectangular to polar

$$\text{QA } (-4, -5)$$

Use  $r = \sqrt{x^2 + y^2}$   
 $\tan \theta = \frac{y}{x}$

$$r = \sqrt{16 + 25} = \sqrt{41}$$

$$\tan \theta = -\frac{5}{4}$$

$$\text{RA } \theta = 51.34$$

$$(\sqrt{41}, 231.34^\circ)$$

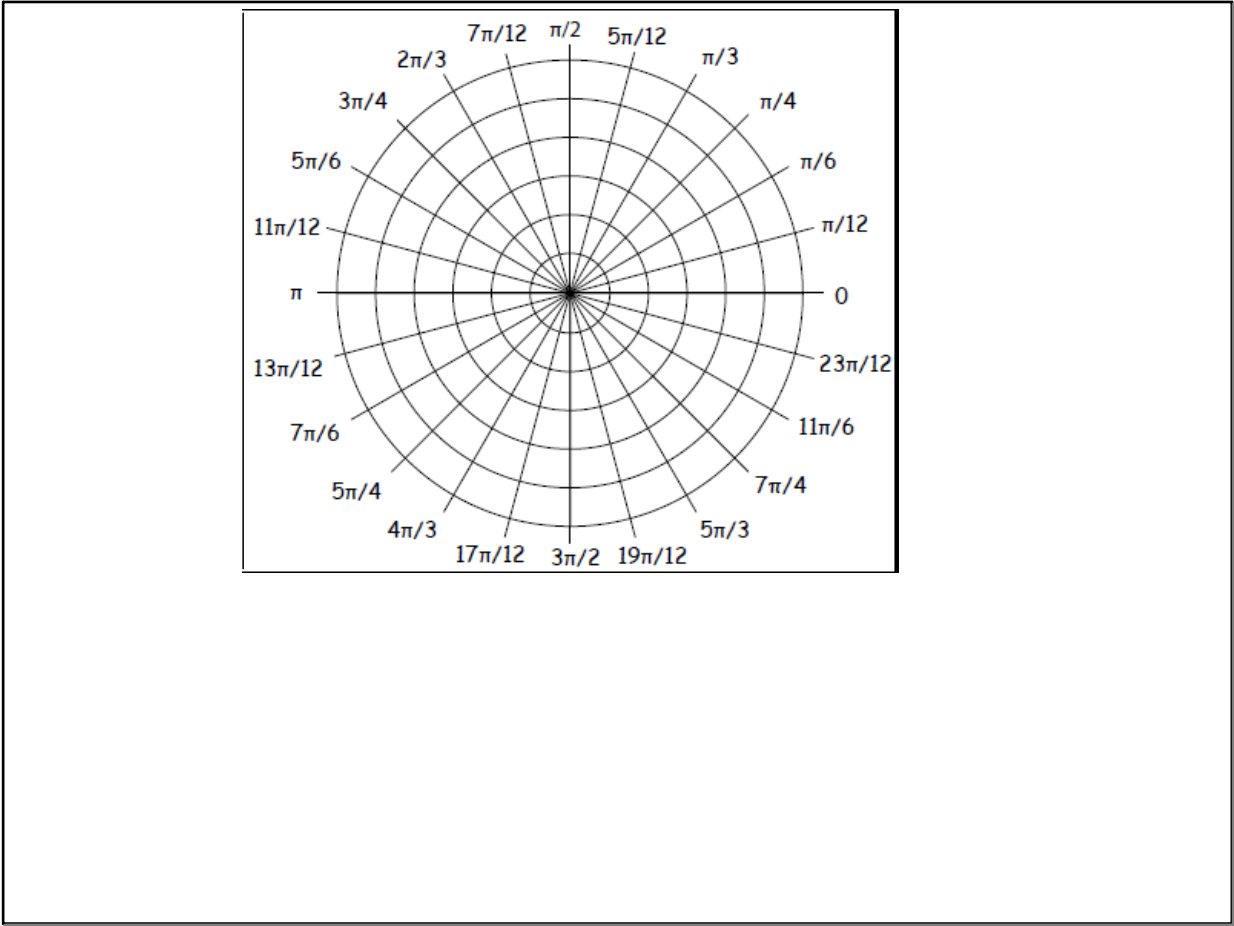
Apr 19-9:54 AM

## HOMework



p 783 1-31 odd

Feb 2-9:51 PM



Apr 19-9:29 AM