

Chapter 9 Review Highlights

Warm up : Write all the Quest topics you can think of.

Parametric Equations

- rectangular
- polar conic

Polar Coordinates

- Equivalent points

Convert Polar Coordinates to rectangular


Convert Rectangular Coordinates to polar

Convert Rectangular Equations to Polar Equations

Convert Polar Equations to Rectangular Equations

Graphing Polar Graphs by hand


Apr 30-4:05 PM

GO COUGARS! 


p 720 Homework Questions

In Exercises 1-4, identify the type of polar graph.


1. $r = 3 \cos \theta$




2. $r = 3 \sin \theta$




3. $r = 4 \cos \theta$




4. $r = 4 \sin \theta$




5. $r = 1 + \cos \theta$




6. $r = 1 + \sin \theta$



In Exercises 7-10, determine the equation of the polar curve whose graph is shown.

7. 

8. 

In Exercises 21-26, sketch the graph of the polar equation. Use a graphing utility to verify your graph.

21. $r = 3$

22. $r = 3 \cos \theta$

23. $r = 3 \sin \theta$

24. $r = 2 + \cos \theta$

25. $r = 3 - \cos \theta$

26. $r = 2 \cos \theta$

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

5. $r = 3 \sin \theta$

9. $r = 3 + 3 \cos \theta$

2. $r = 2 - 4 \cos \theta$

6. $\theta = \frac{7\pi}{6}$

10. $r = 4 \cos \theta$

3. $r = 2 + 2 \sin \theta$


7. $r = -3$


11. $\theta = -\pi$


4. $r = -2 \csc \theta$


8. $r = 2 - \cos \theta$


12. $r = 4 \sec \theta$


1. 


5. 


9. 


2. 


6. 


10. 


3. 

7. 

11. 

4. 

8. 

12. 

~~$3 \csc(\theta - \frac{\pi}{6})$~~

Feb 2-9:51 PM

Chapter 9 Review

Find the rectangular equation by eliminating the parameter. Sketch the graph and state the domain and range of the rectangular equation.

1. $x = 3t + 2$
 $y = t + 1$

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

3. $x = \sqrt{2t}$
 $y = 4t$

4. $x = 2 \cos t$
 $y = 3 - 2 \sin t$

5. $x = 1 - 2 \cos t$
 $y = 2 + 5 \sin t$

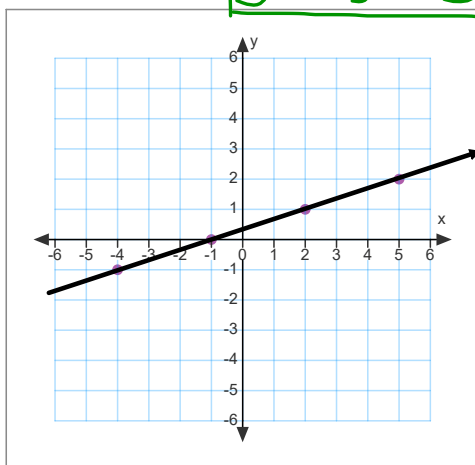
May 7-5:42 AM

$x = 3t + 2$
 $y = t + 1$

$D_x (-\infty, \infty) \Rightarrow (-\infty, \infty)$
 $D_y (-\infty, \infty)$

t	x	y
-2	-4	-1
-1	-1	0
0	2	1
1	5	2
2	8	3

$\frac{x-2}{3} = t$
 $y = \frac{x-2}{3} + 1$
 $= \frac{1}{3}x - \frac{2}{3} + 1$
 $y = \frac{1}{3}x + \frac{1}{3}$



$D (-\infty, \infty)$
 $R (-\infty, \infty)$

May 4-9:31 AM

$$x = t^2 + 4$$

$$y = t^2 - 4$$

t	x	y
-2	8	0
-1	5	-3
0	4	-4
1	5	-3
2	8	0

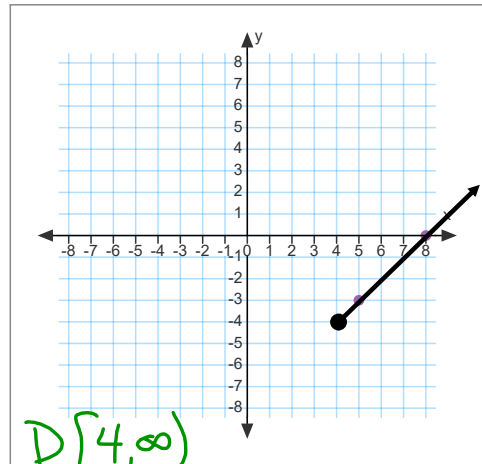
$$D_x = (-\infty, \infty) \Rightarrow (-\infty, \infty)$$

$$D_y = (-\infty, \infty)$$

$$x - 4 = t^2$$

$$y = x - 4 - 4$$

$$y = x - 8$$



$$D[4, \infty)$$

$$R[-4, \infty)$$

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$$x = \sqrt{2t}$$

$$y = 4t$$

t	x	y
0	0	0
2	2	8
8	4	32

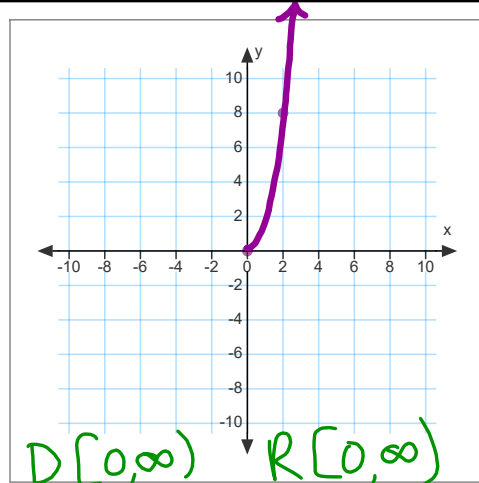
$$D_x [0, \infty) \Rightarrow [0, \infty)$$

$$D_y (-\infty, \infty)$$

$$\frac{x^2}{2} = t$$

$$y = 4\left(\frac{x^2}{2}\right)$$

$$y = 2x^2$$



$$D[0, \infty)$$

$$R[0, \infty)$$

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$x = 2 \cos t$
 $y = 3 - 2 \sin t$

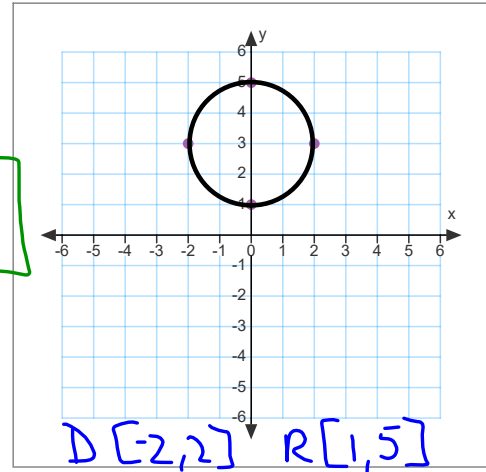
$D_x (-\infty, \infty) \rightarrow (-\infty, \infty)$
 $D_y (-\infty, \infty)$

t	x	y
0	2	3
$\frac{\pi}{2}$	0	1
π	-2	3
$\frac{3\pi}{2}$	0	5
2π	2	3

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

(same coeff. = circle!)

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



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$x = 1 - 2 \cos t$
 $y = 2 + 5 \sin t$

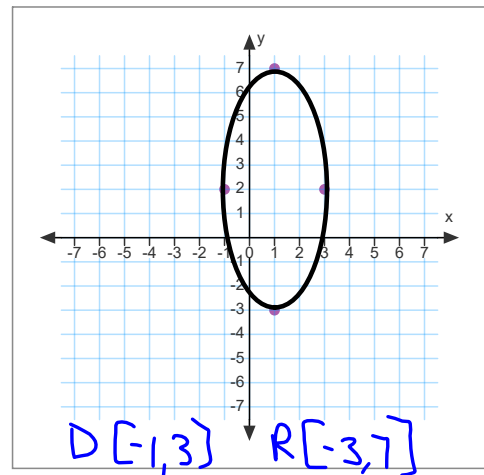
$D_x (-\infty, \infty) \Rightarrow (-\infty, \infty)$
 $D_y (-\infty, \infty)$

t	x	y
0	-1	2
$\frac{\pi}{2}$	1	7
π	3	2
$\frac{3\pi}{2}$	1	-3
2π	-1	2

$\frac{x-1}{-2} = \cos t$ $\frac{y-2}{5} = \sin t$
 $\left(\frac{x-1}{-2}\right)^2 = \cos^2 t$ $\left(\frac{y-2}{5}\right)^2 = \sin^2 t$

(different coeff = ellipse!)

$\frac{(x-1)^2}{4} + \frac{(y-2)^2}{5} = 1$

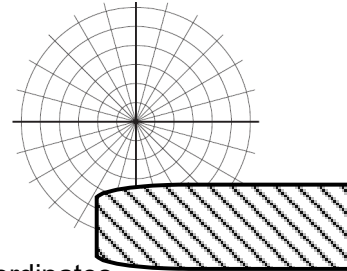


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6. Plot the polar point and state 3 equivalent points with the following constraints.

$$\left(5, \frac{5\pi}{3}\right) \quad \begin{array}{l} r < 0, \quad 0 \leq \theta < 2\pi \\ r > 0, \quad -2\pi \leq \theta < 0 \\ r > 0, \quad 2\pi \leq \theta < 4\pi \end{array}$$

$$\left(-5, \frac{2\pi}{3}\right) \quad \left(5, -\frac{\pi}{3}\right) \quad \left(5, \frac{11\pi}{3}\right)$$



7. Convert from polar coordinates to rectangular coordinates.

a) $(6, 150^\circ)$

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

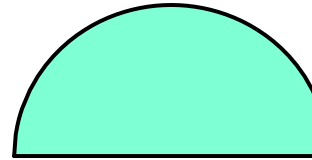
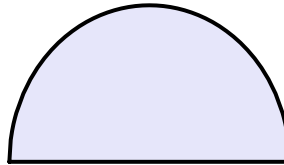
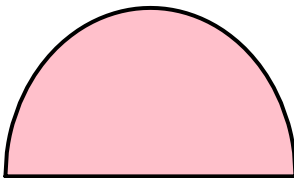
c) $(-3.2, 185^\circ)$

calc ok

$$(-3\sqrt{3}, 3)$$

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

$$(3.19, .23)$$



May 7-5:51 AM

8. Find the polar coordinates for the following rectangular points. (in radians)

a) $(-1, \sqrt{3})$

$$r = \sqrt{(-1)^2 + (\sqrt{3})^2}$$

$$r = 2$$

$$\tan \theta = \sqrt{3}$$

$$\theta = \frac{\pi}{3} \text{ (RA)}$$

$$\text{QII } \theta = \frac{2\pi}{3}$$

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

b) $(4, 0)$

$$r = \sqrt{4^2 + 0^2} = 4$$

$$\tan \theta = \frac{0}{4}$$

$$\theta = 0$$

$$(4, 0)$$

c) $(-5, -7)$

calc ok

$$r = \sqrt{(-5)^2 + (-7)^2} = \sqrt{74}$$

$$\tan \theta = \frac{7}{5}$$

$$\theta = 54.41 \text{ (RA)}$$

$$\text{QIII } \theta = 234.46$$

$$\left(\sqrt{74}, 234.46^\circ\right)$$

May 7-6:02 AM

9. Convert the rectangular equation to a polar equation.

a) $2x^2 + 2y^2 = 5$

$$2(x^2 + y^2) = 5$$

$$x^2 + y^2 = \frac{5}{2}$$

$$r^2 = \frac{5}{2}$$

$$r = \sqrt{\frac{5}{2}}$$

b) $2xy = 1$

$$2r \cos \theta r \sin \theta = 1$$

$$2r^2 \cos \theta \sin \theta = 1$$

$$r^2 = \frac{1}{2 \cos \theta \sin \theta}$$

$$r^2 = \frac{1}{2} \sec \theta \csc \theta$$

c) $x = 12$

$$r \cos \theta = 12$$

$$r = \frac{12}{\cos \theta}$$

$$r = 12 \sec \theta$$

May 7-6:10 AM

10. Convert the polar equation to a rectangular equation.

a) $r = -3 \sin \theta$

$$r^2 = -3r \sin \theta$$

$$x^2 + y^2 = -3y$$

$$x^2 + \left(y^2 + 3y + \frac{3^2}{2}\right) = 0 + \frac{9}{4}$$

$$x^2 + \left(y + \frac{3}{2}\right)^2 = \frac{9}{4}$$

b) $r = 2$

$$r^2 = 4$$

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

c) $\theta = \frac{4\pi}{3}$

$$\tan \theta = \tan \frac{4\pi}{3}$$

$$\frac{y}{x} = \sqrt{3}$$

$$y = \sqrt{3}x$$

d) $r = \sin \theta - \cos \theta$

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

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

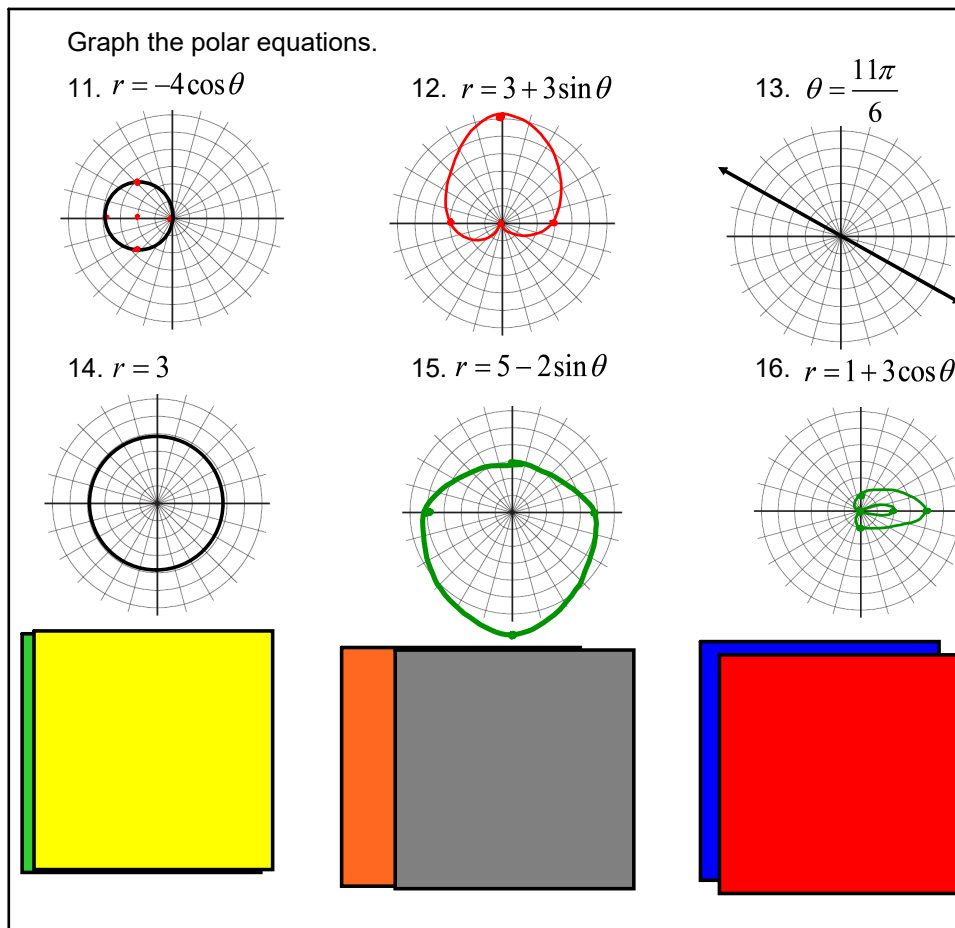
$$\left(x^2 + x + \frac{1^2}{2}\right) +$$

$$\left(y^2 - y + \frac{1^2}{2}\right)$$

$$= \frac{1}{4} + \frac{1}{4}$$

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

May 7-6:13 AM



May 7-6:18 AM

Additional Questions

1. $x = t + 2$

2. $x = \sqrt{t} + 4$

3. $x = 2\sin t$

4. $x = 5 + 3\cos t$

$y = \sqrt{t}$

$y = \sqrt{t} - 4$

$y = 1 + 2\cos t$

$y = 2 + \sin t$

5. Plot and state 3 equivalent points for $\left(-3, \frac{7\pi}{6}\right)$.6. Convert to rectangular: #5 without calc and $(2, 2.5)$ with calc.7. Convert to polar: $(-\sqrt{3}, 1)$, $(1, -1)$.8. Convert to polar: $xy = 2$

$2x - y = 3$

$y = -4$

9. Convert to rectangular: $\theta = \frac{4\pi}{3}$

$r = 2$

$r = -2\sin\theta$

May 7-6:26 AM

HOMework



p 731 69-86 (omit 72-74)

all by hand

99-139 odd

Feb 2-9:51 PM