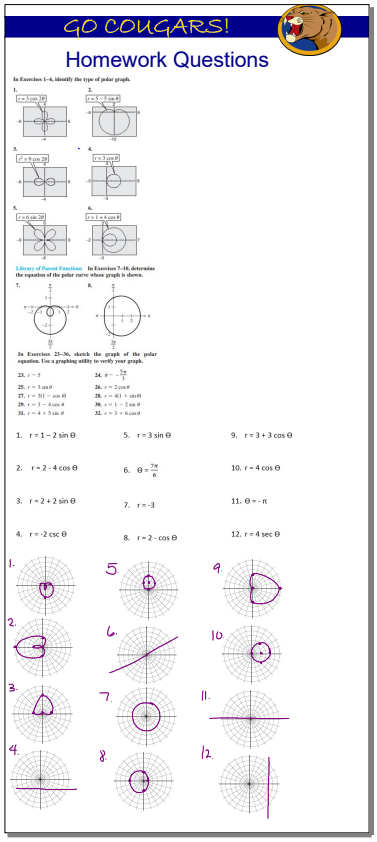


Feb 2-9:51 PM

Chapter 10 Part 2 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. $x = 1 - 2\cos t$, $y = 2 + 5\sin t$

6. $x = 3 + \sec t$, $y = -2 + \tan t$

May 7-5:42 AM

$x = 3t + 2$

$y = t + 1$

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

D_y $(-\infty, \infty)$

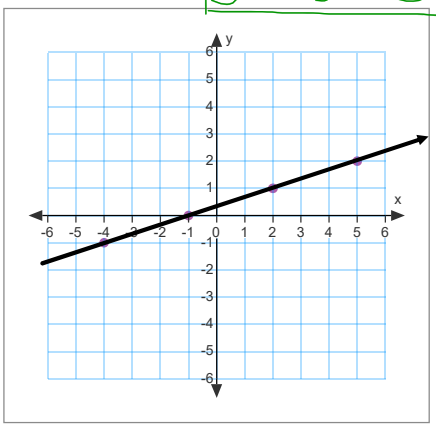
t	x	y
-2	-4	-1
-1	-1	0
0	2	1
1	5	2
2	8	3

$\frac{x-2}{3} = t$

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

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

$y = \frac{1}{3}x + \frac{1}{3}$



D $(-\infty, \infty)$

R $(-\infty, \infty)$

May 4-9:31 AM

$x = t^2 + 4$

$y = t^2 - 4$

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

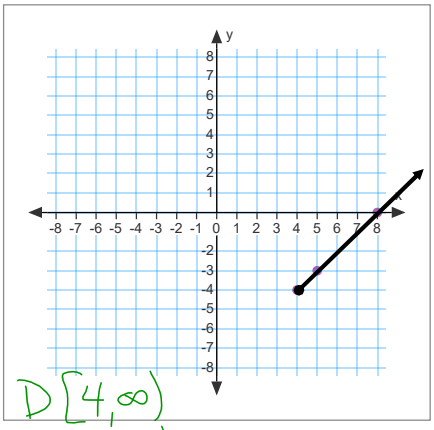
D_y $(-\infty, \infty)$

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

$x - 4 = t^2$

$y = x - 4 - 4$

$y = x - 8$



D $[4, \infty)$

R $[-4, \infty)$

May 4-9:38 AM

$x = \sqrt{2t}$

$y = 4t$

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

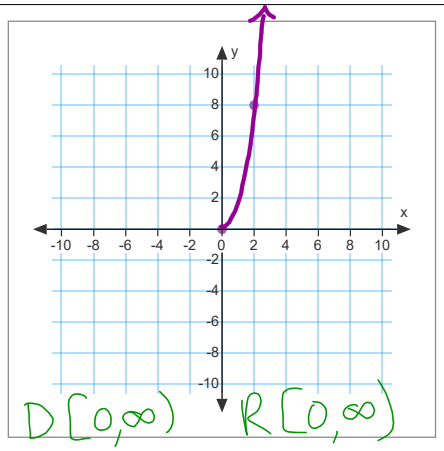
D_y $(-\infty,\infty)$

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

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

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

$y = 2x^2$



D $[0,\infty)$ R $[0,\infty)$

May 4-9:40 AM

$x = 2\cos t$

$y = 3 - 2\sin t$

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

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

$\left(\frac{x}{2}\right)^2 = \cos^2 t$

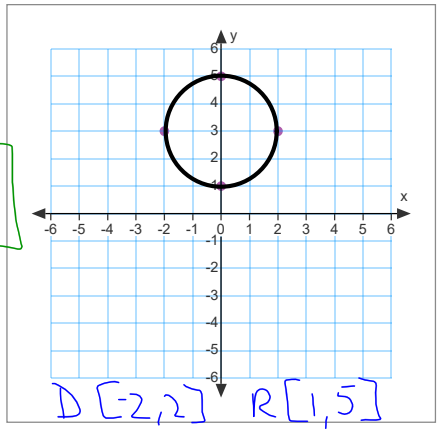
$\frac{y-3}{2} = \sin t$

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

(same coeff. = circle!)

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

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



D $[-2,2]$ R $[1,5]$

May 4-9:47 AM

$x = 1 - 2\cos t$

$y = 2 + 5\sin t$

Dx $(-\infty, \infty)$

Dy $(-\infty, \infty)$ $\Rightarrow (-\infty, \infty)$

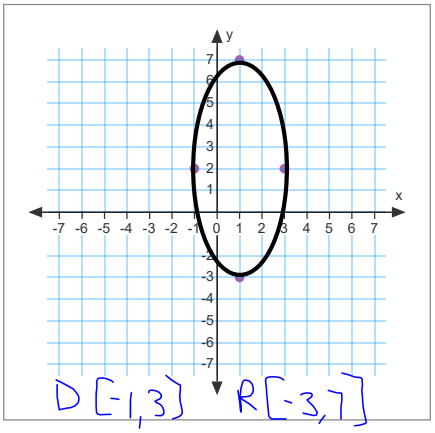
t	x	y
0	-1	2
$\frac{\pi}{2}$	1	7
π	3	2
$\frac{3\pi}{2}$	1	-3
2π	-1	2

$\frac{x-1}{-2} = \cos t$ $\quad \frac{y-2}{5} = \sin t$

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

$$\frac{(x-1)^2}{4} + \frac{(y-2)^2}{25} = 1$$

(different coeff = ellipse!)



May 4-9:51 AM

$x = 3 + \sec t$

$y = -2 + \tan t$

Dx $(-\infty, \infty)$ $t \neq \frac{k\pi}{2}$, k is odd $\Rightarrow (-\infty\infty)$ $k \neq \frac{k\pi}{2}$

Dy $(-\infty, \infty)$ $t \neq \frac{k\pi}{2}$, k is odd

Rx $(-\infty, 2]\ [4, \infty)$

Ry $(-\infty, \infty)$

t	x	y
0	4	-2
$\frac{\pi}{2}$	und	und
π	2	-2
$\frac{3\pi}{2}$	und	und
2π	4	-2

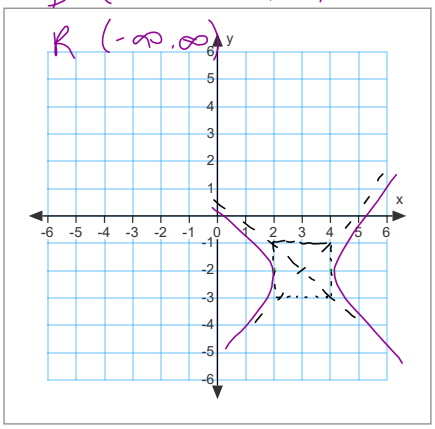
$(x-3)^2 = \sec^2 t$

$(y+2)^2 = \tan^2 t$

$(x-3)^2 - (y+2)^2 = 1$

D $(-\infty, 2]\ [4, \infty)$

R $(-\infty, \infty)$



May 11-1:38 PM

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

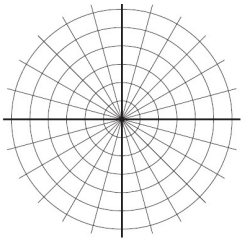
$\left(5, \frac{5\pi}{3}\right)$

$r < 0, \quad 0 \le \theta < 2\pi$

$r > 0, \quad -2\pi \le \theta < 0$

$r > 0, \quad 2\pi \le \theta < 4\pi$

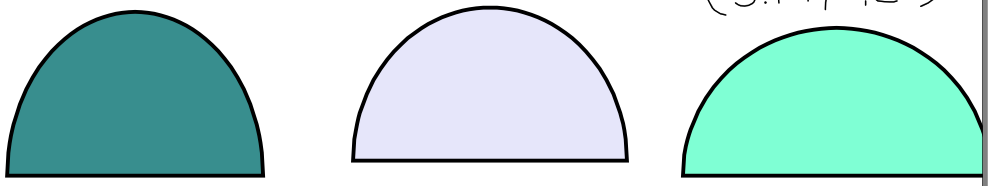
$\left(-5, \frac{2\pi}{3}\right)$ $\left(5, -\frac{\pi}{3}\right)$ $\left(5, \frac{11\pi}{3}\right)$



8. Convert from polar coordinates to rectangular coordinates.

a) $(6, 150°)$ b) $\left(-3, -\frac{3\pi}{4}\right)$ c) $(-3.2, 185°)$ calc ok

$(-3\sqrt{3}, 3)$ $\left(\frac{3}{\sqrt{2}}, \frac{3}{\sqrt{2}}\right)$ $(3.19, .28)$



May 7-5:51 AM

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

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

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

$r = 2$

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

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

(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) $(-5, -7)$ (in degrees)

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

$= \sqrt{74}$

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

$\theta = 54.41$ (RA)

QIII $\theta = 234.46$

$(\sqrt{74}, 234.46°)$

May 7-6:02 AM

10. 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

11. Convert the polar equation to a rectangular equation.

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

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

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

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

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

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

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

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

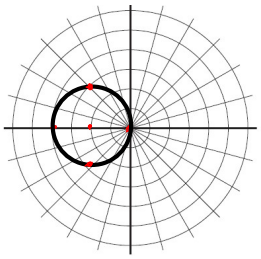
$(x^2+x+\frac{1^2}{2})+(y^2-y+\frac{1^2}{2})=\frac{1}{4}+\frac{1}{4}$

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

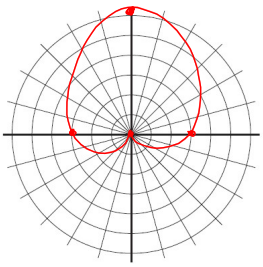
May 7-6:13 AM

Graph the polar equations.

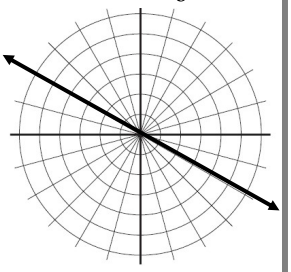
12. $r = -4\cos\theta$



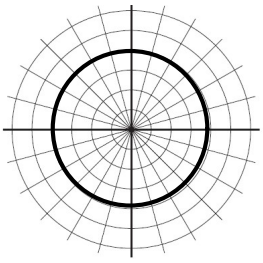
13. $r = 3 + 3\sin\theta$



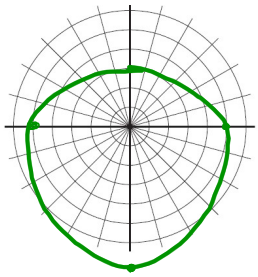
14. $\theta = \frac{11\pi}{6}$



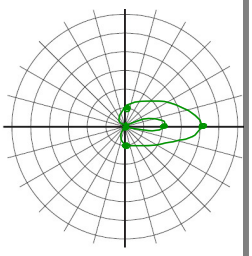
15. $r = 3$



16. $r = 5 - 2\sin\theta$



17. $r = 1 + 3\cos\theta$



May 7-6:18 AM

Additional Questions

1. $x = t + 2$, $y = \sqrt{t}$

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

3. $x = 2\sin t$, $y = 1 + 2\cos t$

4. $x = 5 + 3\cos t$, $y = 2 + \sin t$

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

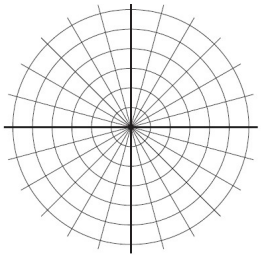
8. Convert to polar: $xy = 2$
   $2x - y = 3$
   $y = -4$

9. Convert to rectangular: $\theta = \frac{4\pi}{3}$
   $r = 2$
   $r = -2\sin\theta$

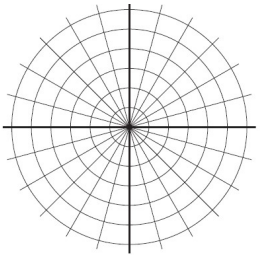
May 7-6:26 AM

Graph the polar equations

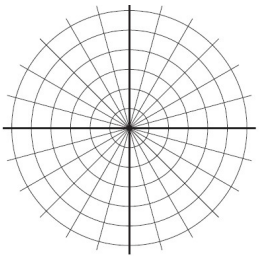
$r = 3\sin 5\theta$



$r = 4\cos 4\theta$



$r^2 = 36\sin 2\theta$



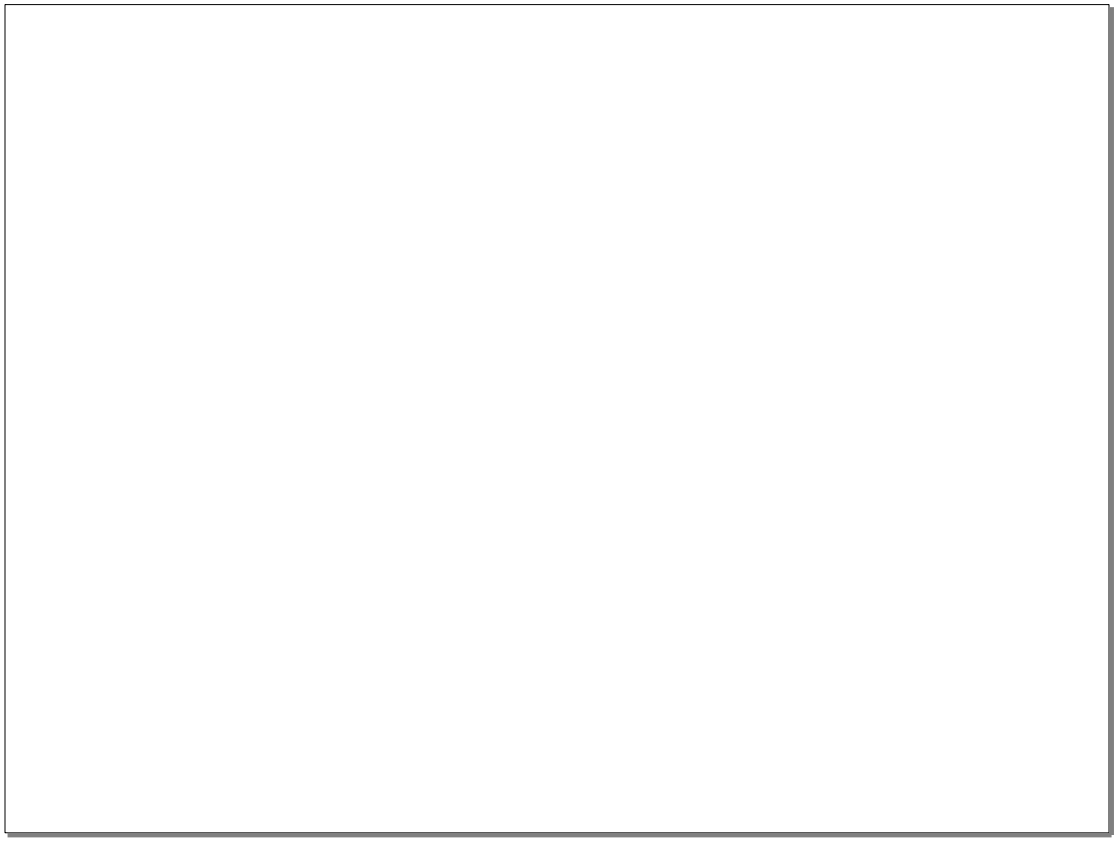
May 4-9:40 AM

HOMEWORK

p 802 53-102 omit #64

all graphs by hand

Feb 2-9:51 PM



Apr 26-1:14 PM