

ELLIPSES & CIRCLES

$$\begin{aligned}x &= r_1 \cos(t) + h \\y &= r_2 \sin(t) + k\end{aligned}$$

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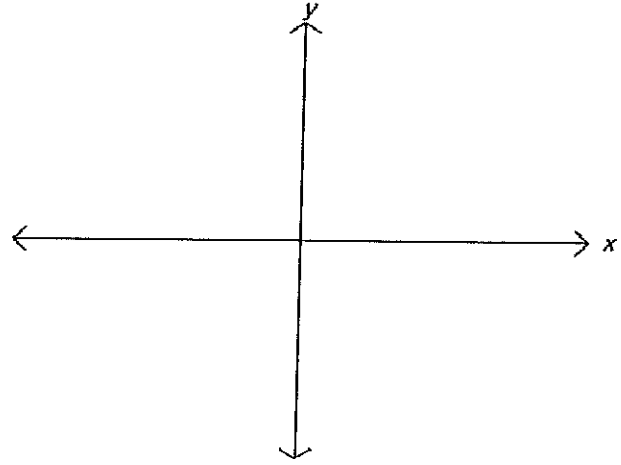
$$\text{Identity used: } (\sin\theta)^2 + (\cos\theta)^2 = 1$$

6. $x = 5 \cos t + 3$
 $y = 3 \sin t - 2$

Rectangular Equation:

Domain:

Range:

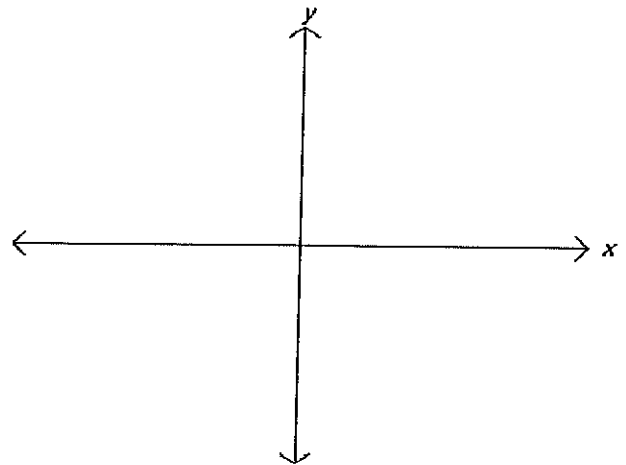


7. $x = 2 \sin t$
 $y = \sqrt{10} \cos t$

Rectangular Equation:

Domain:

Range:

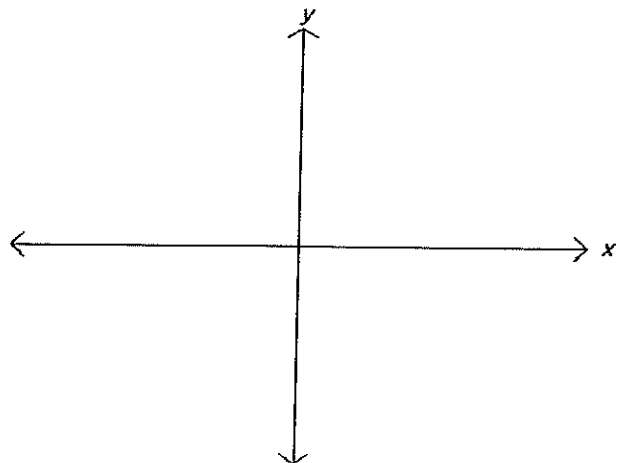


8. $x = 4 \cos t - 2$
 $y = 4 \sin t$

Rectangular Equation:

Domain:

Range:

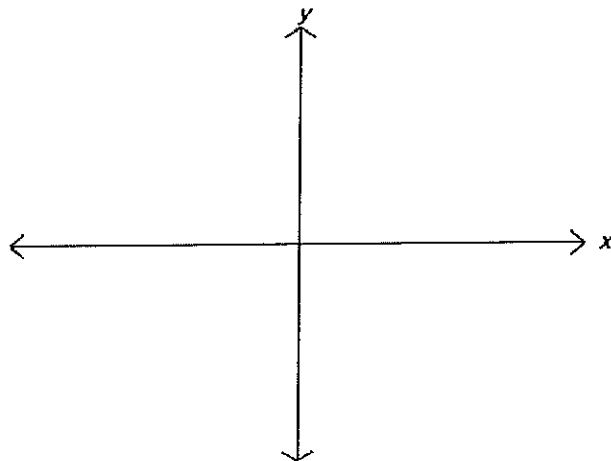


9. $x = \sqrt{3} \sin t + 4$
 $y = \sqrt{3} \cos t + 3$
 $t \in [0, 3\pi/2)$

Rectangular Equation:

Domain:

Range:

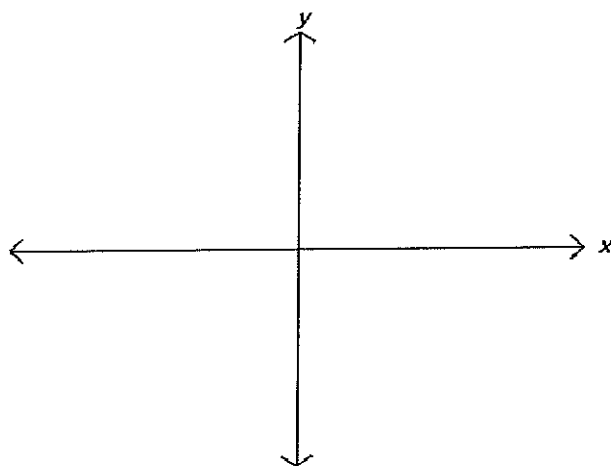


10. $x = 6 \cos t$
 $y = 3 \sin t + 1$
 $t \in [0, 3\pi/2)$

Rectangular Equation:

Domain:

Range:

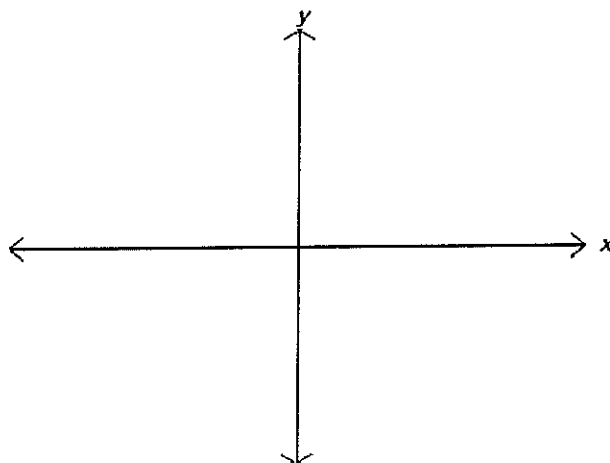


11. $x = \cos t + 3$
 $y = 2 \sin t$
 $t \in (0, \pi/2]$

Rectangular Equation:

Domain:

Range:

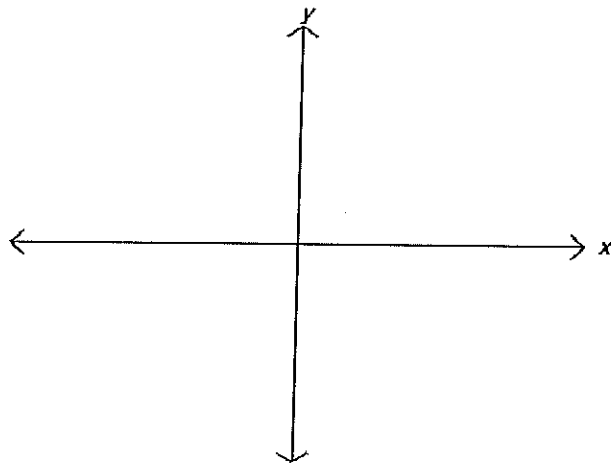


12. $x = 5 \sin t - 2$
 $y = 5 \cos t + 3$

Rectangular Equation:

Domain:

Range:

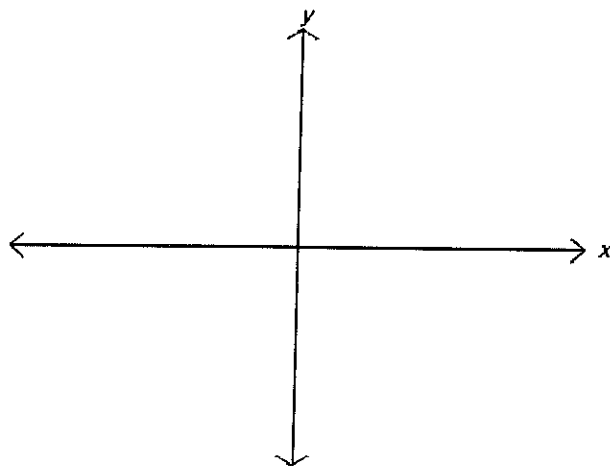


13. $x = 2\sqrt{3} \sin t - 2$
 $y = 3\sqrt{2} \cos t + 3$

Rectangular Equation:

Domain:

Range:



14. Write two different sets of parametric equations for a circle with equation $(x - 2)^2 + (y + 4)^2 = 9$. Determine which one will move clockwise, and which will move counterclockwise.

15. Write a parametric equation for $\frac{(x+5)^2}{8} + \frac{y^2}{12} = 1$ for which t will rotate clockwise

16. Write a parametric equation for $\frac{(x-5)^2}{16} + \frac{(y+2)^2}{25} = 1$ for which t will rotate counterclockwise.

HYPERBOLAS

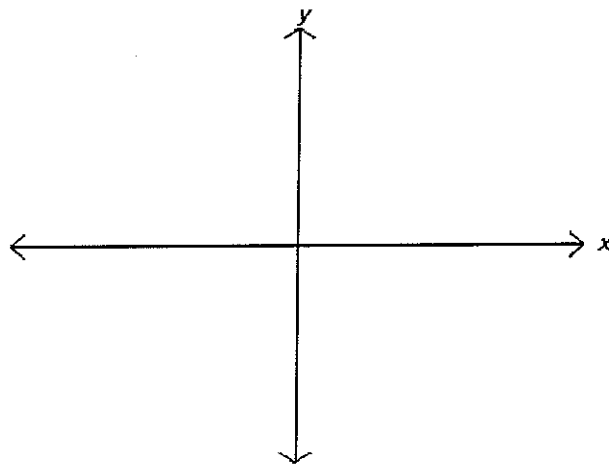
<u>Horizontal</u>		<u>Vertical</u>	
$x = r_1 \sec(t) + h$	$x = r_1 \csc(t) + h$	$x = r_1 \tan(t) + h$	$x = r_1 \cot(t) + h$
$y = r_2 \tan(t) + k$	$y = r_2 \cot(t) + k$	$y = r_2 \sec(t) + k$	$y = r_2 \csc(t) + k$

Identities: $\sec^2 - \tan^2 = 1$ or $\csc^2 - \cot^2 = 1$

Note: Orientation/direction as t increases in hyperbolas is VERY funky. I will show you in class, but you will not be accountable for it on an assessment. It is worth seeing at least once, though, because it's kind of cool.

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

Rectangular Equation:

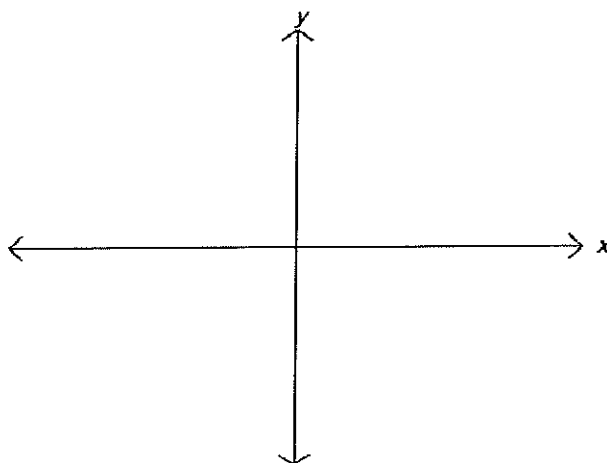


Domain:

Range:

18. $x = \sqrt{3} \tan t$
 $y = 5 \sec t - 4$

Rectangular Equation:

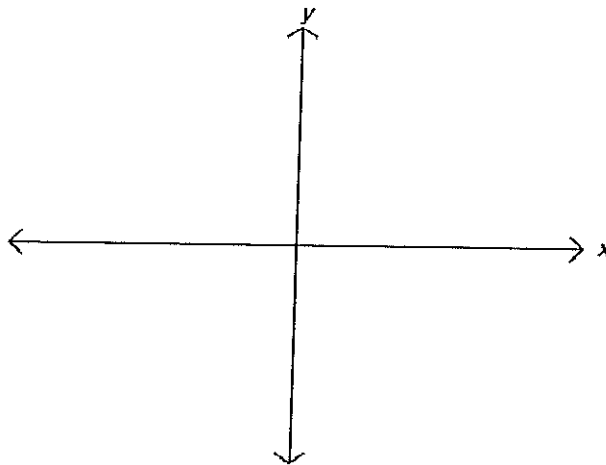


Domain:

Range:

19. $x = 3 \csc t - 2$
 $y = 5 \cot t - 4$

Rectangular Equation:

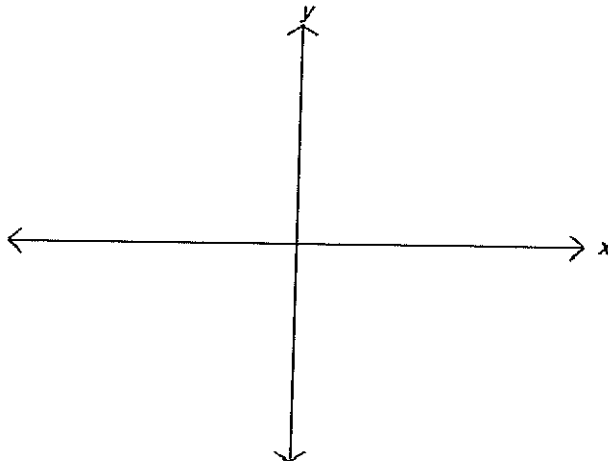


Domain:

Range:

20. $x = 4 \cot t + 4$
 $y = 2 \csc t + 3$

Rectangular Equation:



Domain:

Range:

21. Write a parametric equation for $\frac{(y-8)^2}{36} - \frac{(x+1)^2}{49} = 1$

22. Write a parametric equation for $\frac{x^2}{20} - \frac{(y+2)^2}{12} = 1$

Put it all together:

1. Classify the conic with direction of opening, and write a set of parametric equations for each.

a. $(x+3)^2 + (y-1)^2 = 16$

e. $\frac{(x-5)^2}{16} + \frac{(y+2)^2}{25} = 1$

b. $\frac{(x+5)^2}{8} + \frac{y^2}{12} = 1$

f. $\frac{(y-8)^2}{36} - \frac{(x+1)^2}{49} = 1$

c. $\frac{x^2}{20} - \frac{(y+2)^2}{12} = 1$

g. $x^2 + y^2 - 6x - 2y - 10 = 0$

d. $(x-1)^2 = (y+5)$

h. $y^2 = (x+2)$

2. Classify the conic with direction of opening, and write a rectangular equation for each.

a. $\begin{cases} x = \cos(t) + 2 \\ y = \cos^2(t) - 3 \end{cases}$

f. $\begin{cases} x = \sin^2(t) - 2 \\ y = \sin(t) \end{cases}$

b. $\begin{cases} x = 3\cos(t) + 2 \\ y = 5\sin(t) - 3 \end{cases}$

g. $\begin{cases} x = 12\cos(5t) + 4 \\ y = 12\sin(5t) - 1 \end{cases}$

c. $\begin{cases} x = \sqrt{5}\sin(t) - 4 \\ y = 3\cos(t) + 8 \end{cases}$

h. $\begin{cases} x = 3\csc(t) + 2 \\ y = 8\cot(t) - 3 \end{cases}$

d. $\begin{cases} x = 3\tan(2t) \\ y = 5\sec(2t) \end{cases}$

i. $\begin{cases} x = 4 + 3\cot(t) \\ y = 4 + 5\csc(t) \end{cases}$

e. $\begin{cases} x = 3\sec(t) + 9 \\ y = 5\tan(t) - 8 \end{cases}$

j. $\begin{cases} x = 5\cos(t) + 4 \\ y = 5\sin(t) + 4 \end{cases}$