

# Day 1

Wednesday, December 06, 2017

9:06 PM



## Precal Unit 7(full) Assl...

### Warm-up: Trig Review

1. Find the exact value of  $\sin^{-1}\left(\sin\frac{\pi}{2}\right)$ .

A  $-\frac{\pi}{2}$

B  $-\frac{\pi}{4}$

**C  $\frac{\pi}{2}$**

D  $\frac{3\pi}{2}$

2. For which value(s) of  $x$  is the function  $h(x) = \frac{x}{x^2 - 2x - 15}$  discontinuous?

**A 5, -3**

~~B -5, 3~~

C 5, 3

D -5, -3

$$\begin{aligned}x^2 - 2x - 15 &= 0 \\(x - 5)(x + 3) &= 0 \\x = 5 \quad x = -3\end{aligned}$$

3. If  $\sin \theta = -\frac{5}{13}$  on the interval  $\left(\frac{3\pi}{2}, 2\pi\right)$ , find  $\cos 2\theta$ .

A  $-\frac{120}{119}$

B  $-\frac{120}{169}$

C  $-\frac{1}{5}$

**D  $\frac{119}{169}$**

$$\begin{aligned}\cos 2\theta &= 1 - 2\sin^2\theta \\&= 1 - 2\left(-\frac{5}{13}\right)^2 = \frac{119}{169}\end{aligned}$$

4. State the period and phase shift of  $y = 3 \sin\left(x - \frac{\pi}{4}\right) + 2$ .

A  $\frac{\pi}{4}, 2\pi$

**B  $2\pi, \frac{\pi}{4}$**

C 3, 2

D 2, 3

5. Given the parent function  $h(x) = |x|$ , what transformation occurs in the graph of  $q(x) = |x + 2|$ ?

a. A up 2

B down 2

**C left 2**

D right 2

Today's Objective:

Graph parametric equations.

### KeyConcept Parametric Equations

If  $f$  and  $g$  are continuous functions of  $t$  on the interval  $I$ , then the set of ordered pairs  $(f(t), g(t))$  represent a **parametric curve**. The equations

$$x = f(t) \text{ and } y = g(t)$$

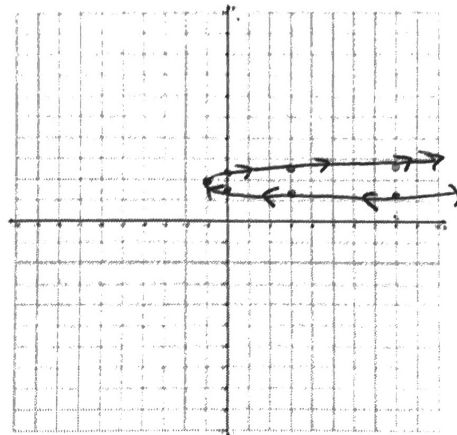
are parametric equations for this curve,  $t$  is the parameter, and  $I$  is the parameter interval.

**EXAMPLE 1** Sketch Curves with Parametric Equations

A. Sketch the curve created by  $x = t^2 - 1$  and  $y = \frac{t}{4} + 2$

over the interval  $-3 \leq t \leq 3$ .

$t$	$x$	$y$
-3	8	1.25
-2	3	1.5
-1	0	1.75
0	-1	2
1	0	2.25
2	3	2.5
3	8	2.75

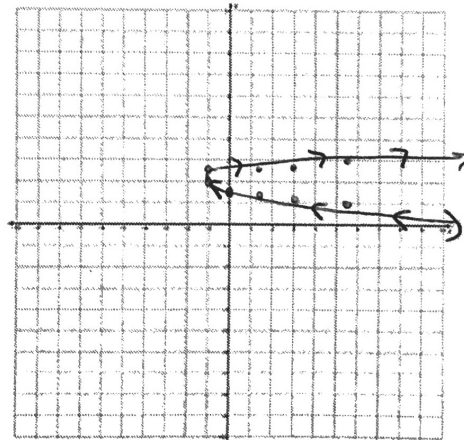


**EXAMPLE 1** Sketch Curves with Parametric Equations

B. Sketch the curve created by  $x = \frac{t^2}{4} - 1$  and  $y = \frac{t}{5} + 2$

over the interval  $-5 \leq t \leq 5$ .

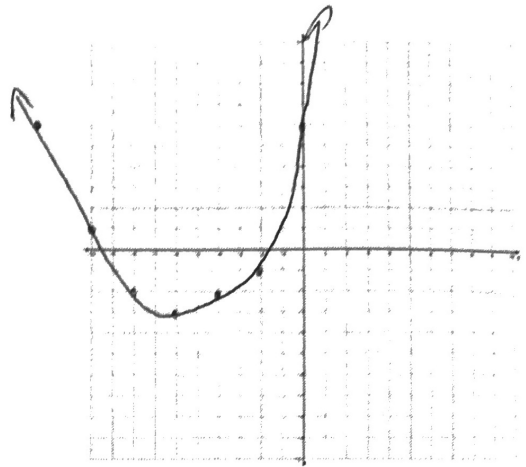
$t$	$x$	$y$
-5	5.25	1
-4	3	1.2
-3	1.25	1.4
-2	0	1.6
-1	-0.75	1.8
0	-1	2
1	-0.75	1.2
2	-1	2.4
3	1.25	2.6
4	3	2.8
5	5.25	3



**EXAMPLE 1****✓ Guided Practice**

Sketch the curve given by  $x = 2t - 6$  and  $y = t^2 - 3$  over  $-3 \leq t \leq 3$ .

$t$	$x$	$y$
-3	-12	6
-2	-10	1
-1	-8	-2
0	-6	-3
1	-4	-2
2	-2	1
3	0	6

**EXAMPLE 2****Write in Rectangular Form**

Write  $y = 2t$  and  $x = t^2 + 2$  in rectangular form by eliminating the parameter,  $t$ .

$$\begin{aligned} x &= t^2 + 2 \\ x - 2 &= t^2 \\ \pm\sqrt{x-2} &= t \end{aligned}$$

$$y = 2(\pm\sqrt{x-2})$$

**EXAMPLE 2****✓ Guided Practice**

Write  $y = 4t^2$  and  $x = 2t - 4$  in rectangular form.

$$\begin{aligned} x &= 2t - 4 \\ x + 4 &= 2t \\ \frac{x+4}{2} &= t \end{aligned}$$

$$\begin{aligned} y &= 4\left(\frac{x+4}{2}\right)^2 \\ y &= 4\left(\frac{x^2+8x+16}{4}\right) \\ y &= x^2+8x+16 \end{aligned}$$

t	x	y
0	1	1/2
1	$\sqrt{2}$	$1/2\sqrt{2}$
2	$\sqrt{3}$	$1/2\sqrt{3}$
3		
4		
5		



**EXAMPLE 3** Rectangular Form with Domain Restrictions

Write  $y = \frac{1}{2t}$  and  $x = \sqrt{t+1}$  in rectangular form. Then graph the equation. State any restrictions on the domain.

$$x = \sqrt{t+1}$$

$$x^2 = t+1$$

$$x^2 - 1 = t$$

domain restrictions

$$t+1 > 0$$

$$t > -1$$

$$\downarrow$$

$$x \geq 0$$

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

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

$$\uparrow$$

$$x \neq \pm 1$$

$$x \geq 0, x \neq 1$$

Can graph on calculator in parametric mode or Desmos as  $(x=, y=)$



**EXAMPLE 3**  **Guided Practice**

Write  $y = \frac{1}{t}$  and  $x = \frac{1}{\sqrt{t}} - 5$  in rectangular form. Then graph the equation. State any restrictions on the domain.

$$\sqrt{t} > 0 \rightarrow \frac{1}{x+5} > 0$$

$$\downarrow$$

$$x+5 > 0$$

$$(x > -5)$$

$$x+5 = \frac{1}{\sqrt{t}}$$

$$\sqrt{t} = \frac{1}{x+5}$$

$$t = \frac{1}{(x+5)^2}$$

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$$y = \frac{1}{x^2+10x+25} = x^2+10x+25$$

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