Warm up

1. Write the three Pythagorean identities.

$\sec^2 x = \tan^2 x + 1$ $\cos^2 x + \sin^2 x = 1$

$1 + \cot^2 x = \csc^2 x$

2. Write the equations of the vertex form of a parabola and the standard form of a circle, ellipse and a hyperbola.

P: $y = a(x-h)^2 + k$ H: $\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$

E: $\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$ C: $(x-h)^2 + (y-k)^2 = r^2$

3. Define domain and range.

D: x values

R: y values

Apr 23-8:56 AM

GO COUGARS!

Homework Questions

Feb 2-9:51 PM

10.6 Parametric Equations

The relation of all ordered pairs (x(*t*), y(*t*)) for all *t* in some interval I, *t* is called the parameter.

For example: A parabola tells an action of an object over the horizontal distance from the origin and height from the origin but it does not include time. Time would be the parameter of the parabolic equation.

Another example: If a ball was suspended by a piece of string above the floor and was swinging back and forth as if it were a pendulum, we can represent the equation of the ball's position in space with respect to time.

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Example 1: Convert the parametric equations (x(t), y(t)) into a rectangular equation (x, y). This is called eliminating the parameter.

$x = 1 + t \qquad y = 2t$

Linearish

Step 1. Determine the domain for each parametric equation and find the 't' overlap or 't bucket' interval.

$D_x = (-\infty, \infty) \quad D_y = (-\infty, \infty) \Rightarrow D_t\,(-\infty, \infty)$

Step 2. Make a (t, x, y) table of values. We'll call this the 't' table.

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

Step 3. Solve for t in terms of x in the x-parameter equation (make it t =).

$x = 1 + t \rightarrow x - 1 = t$

Step 4. Substitute the t = for t in the y-parameter equation.

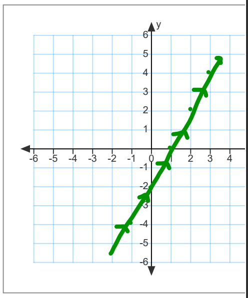
$y = 2t \Rightarrow y = 2(x-1) \Rightarrow y = 2x - 2$

Step 5. Graph the equation from your (x, y) values from your table.

Step 6. State the domain and range of your rectangular equation.

$D_r\,(-\infty, \infty) \quad R_r\,(-\infty, \infty)$

Step 7. Check on your graphing calculator.



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Example 2

$x = -2 + t^2 \qquad y = 1 + 2t^2$

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

* $R_x\ [-2, \infty) \qquad R_y\ [1, \infty)$

t	x	y
-2	2	9
-1	-1	3
0	-2	1
1	-1	3
2	2	9

$x = -2 + t^2$

$x + 2 = t^2$

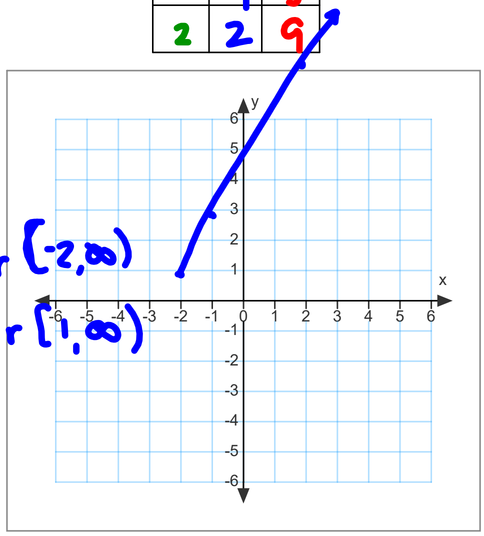
$y = 1 + 2(x+2)$

$y = 2x + 5$

$D_r\ (-\infty, \infty) \quad R_r = (-\infty, \infty)$

$R_x \rightarrow D_r$

$R_y \rightarrow R_r$



$D_r\ [-2, \infty)$

$R_r\ [1, \infty)$

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Example 3 $\quad x = \sqrt{t-2}$

$y = t - 3$

$D_x\ [2, \infty) \qquad R_x\ [0, \infty)$

$D_y\ \cancel{(-\infty, \infty)}\ [2, \infty) \qquad R_y\ \cancel{(-\infty, \infty)}\ [-1, \infty)$

t bucket $[2, \infty)$

t	x	y
2	0	-1
3	1	0
6	2	3

$x = \sqrt{t-2}$

$x^2 + 2 = t$

$y = x^2 + 2 - 3$

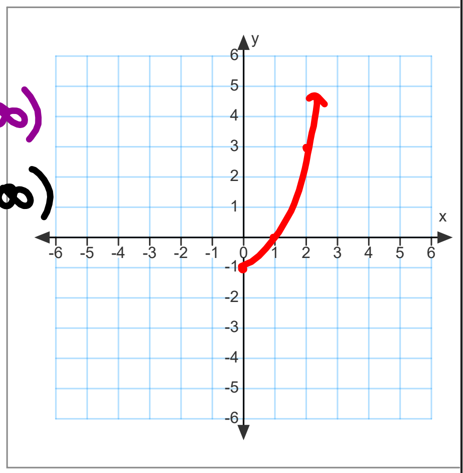
$y = x^2 - 1$

$D_r\ \cancel{(-\infty, \infty)}\ [0, \infty)$

$R_r\ [-1, \infty)$

$D_r\ [0, \infty)$

$R_r\ [-1, \infty)$



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Example 4

Find a set of parametric equations for the rectangular equation given.

$y = 4x - 3$

a) $t = x$

$y = 4t - 3$

b) $t = 2 - x$

$t - 2 = -x$

$2 - t = x$

$y = 4(2-t) - 3$

$= 8 - 4t - 3$

$= 5 - 4t$

Apr 21-10:37 AM

HOMEWORK

p 776 3-11 odd, 19, 21, 23a, 23c,

37-43 odd

Feb 2-9:51 PM

Example 1: Convert the parametric equations (x(t), y(t)) into a rectangular equation (x, y).

$$x = 1 + t \qquad y = 2t$$

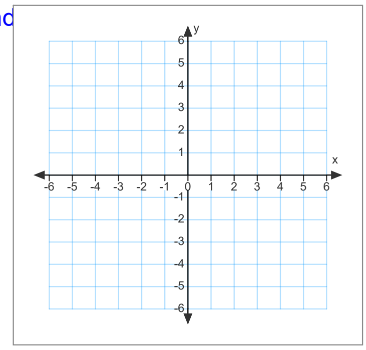
Step 1. Determine the domain and range for each parametric equation.

Step 2. Determine the domain and range of the rectangular equation.

Step 3. Solve for t in terms of x.

Step 4. Substitute for t in the y equation.

Step 5. Graph the equation keeping in mind



Step 6. Check on Calculator.

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