AP Calculus

Chapter 1

Section 1-4

May 13-10:02 PM

Parametric Equations

If x and y are given as functions

$$x = f(t), \quad y = g(t)$$

over an interval of t-values, then the set of points $(x, y) = (f(t), g(t))$ defined by these equations is a **parametric curve**. The equations are **parametric equations** for the curve.

The variable t is a **parameter** for the curve and its domain I is the **parameter interval.** If I is a closed interval, $a \leq t \leq b$, the point $(f(a), g(a))$ is the **initial point of the curve** and the point $(f(b), g(b))$ is the **terminal point of the curve.**

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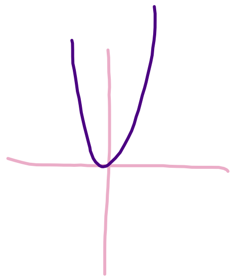
Find y in terms of x (Cartesian equation) for the given parameterization.

$$y = t^2$$

$$x = \sqrt[3]{t} \rightarrow x^3 = t$$

$$y = (x^3)^2 = x^6$$



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What portion of the graph is traced for $t > 0$?

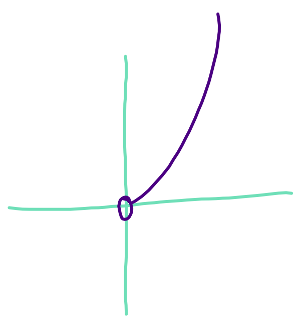
$$y = t^2$$

$$x = \sqrt[3]{t}$$

$$\boxed{\begin{matrix} y > 0 \\ x > 0 \end{matrix}}$$

$$y = x^6$$

Q1



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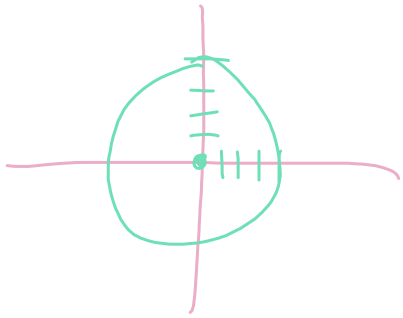
Graph the parametric curve using a graphing utility.

$$x = 4\cos(2t)$$

$$y = 4\sin(2t)$$

$\boxed{\text{MODE}}$ FUNC $\boxed{\text{PAR}}$ POL Seq



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Find a Cartesian equation for the parametric curve

$$x = 4\cos(2t) \rightarrow \left(\frac{x}{4}\right)^2 = \cos^2(2t)$$

$$y = 4\sin(2t) \quad \left(\frac{y}{4}\right)^2 = \sin^2(2t)$$

$$\sin^2 \cancel{x}\,2t + \cos^2 \cancel{x}\,2t = 1$$

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

$$\frac{y^2}{16} + \frac{x^2}{16} = 1$$

$$x^2 + y^2 = 16$$

equation of circle with radius "r"

$$x^2 + y^2 = r^2$$

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Find a Cartesian equation for the parametric curve

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

$$y = 7\sin t \qquad \left(\frac{y}{7}\right)^2 = \sin^2 t$$

$$\sin^2 t + \cos^2 t = 1$$

$$\frac{y^2}{49} + \frac{x^2}{9} = 1$$

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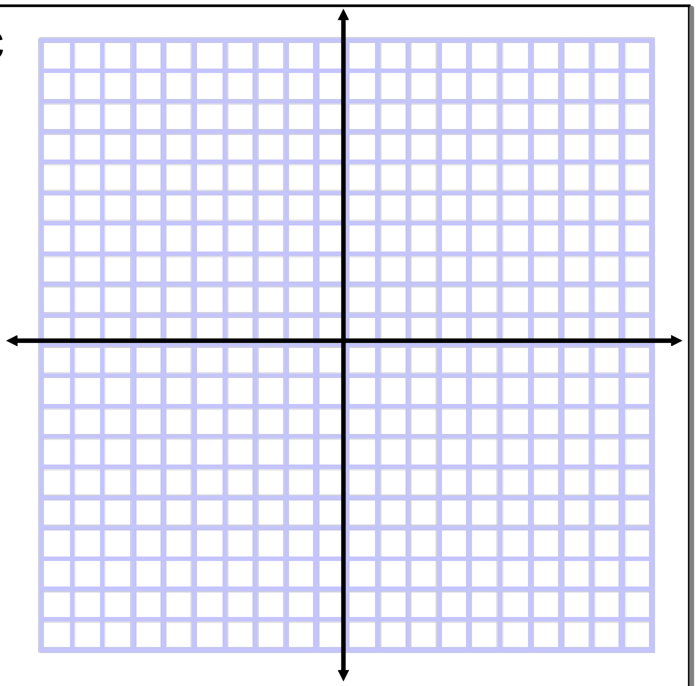
Graphing Parametric Equations

$$x = \sin t \qquad y = \frac{4t}{\pi}$$



Aug 22-9:04 AM

Homework

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1 - 20 all (5-20 part b only)

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