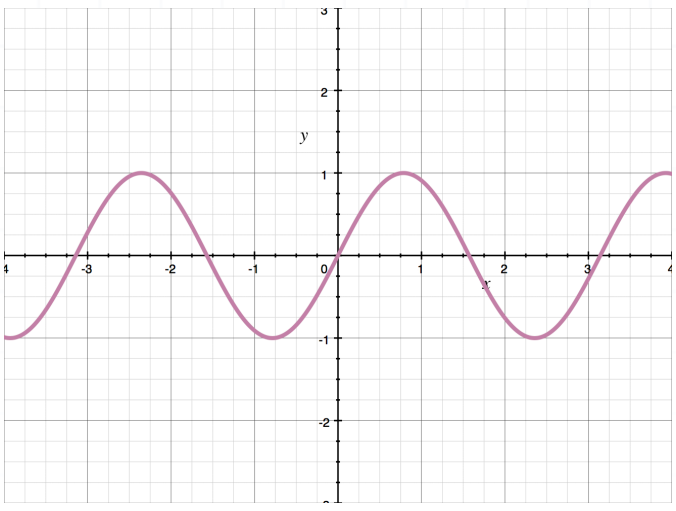
Topic: Sketching the vector equation

Question: Choose the sketch of the vector equation.

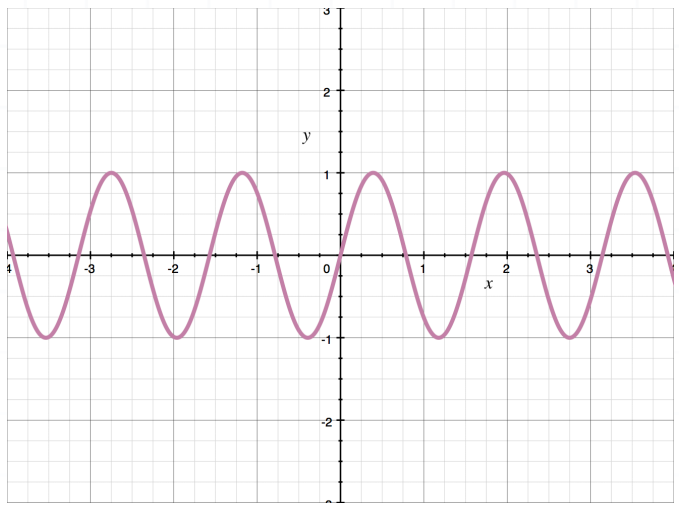
$$r(t) = \langle 2t, \sin t \rangle$$

Answer choices:

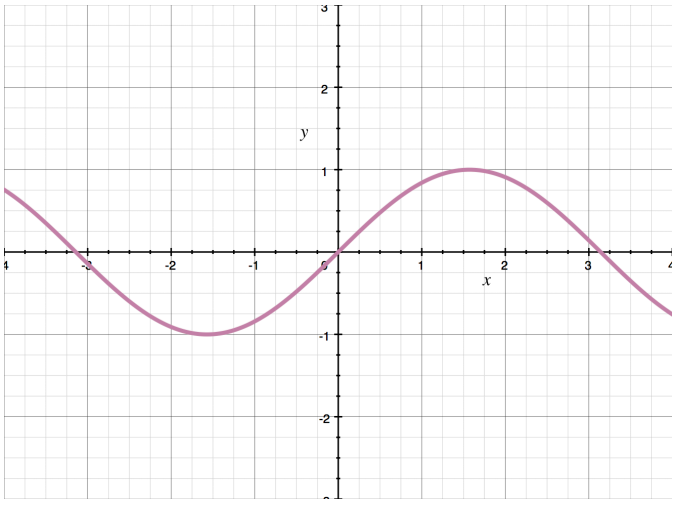
A



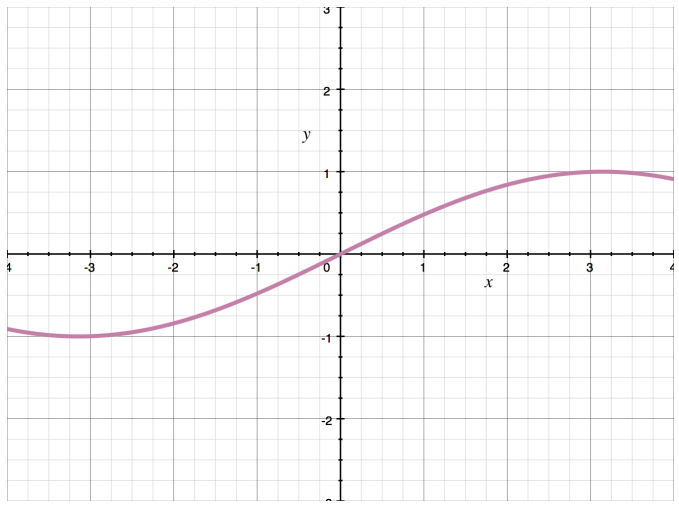
B



C



D



Solution: D

We'll change the vector equation to its parametric form.

$$x = 2t$$

$$y = \sin t$$

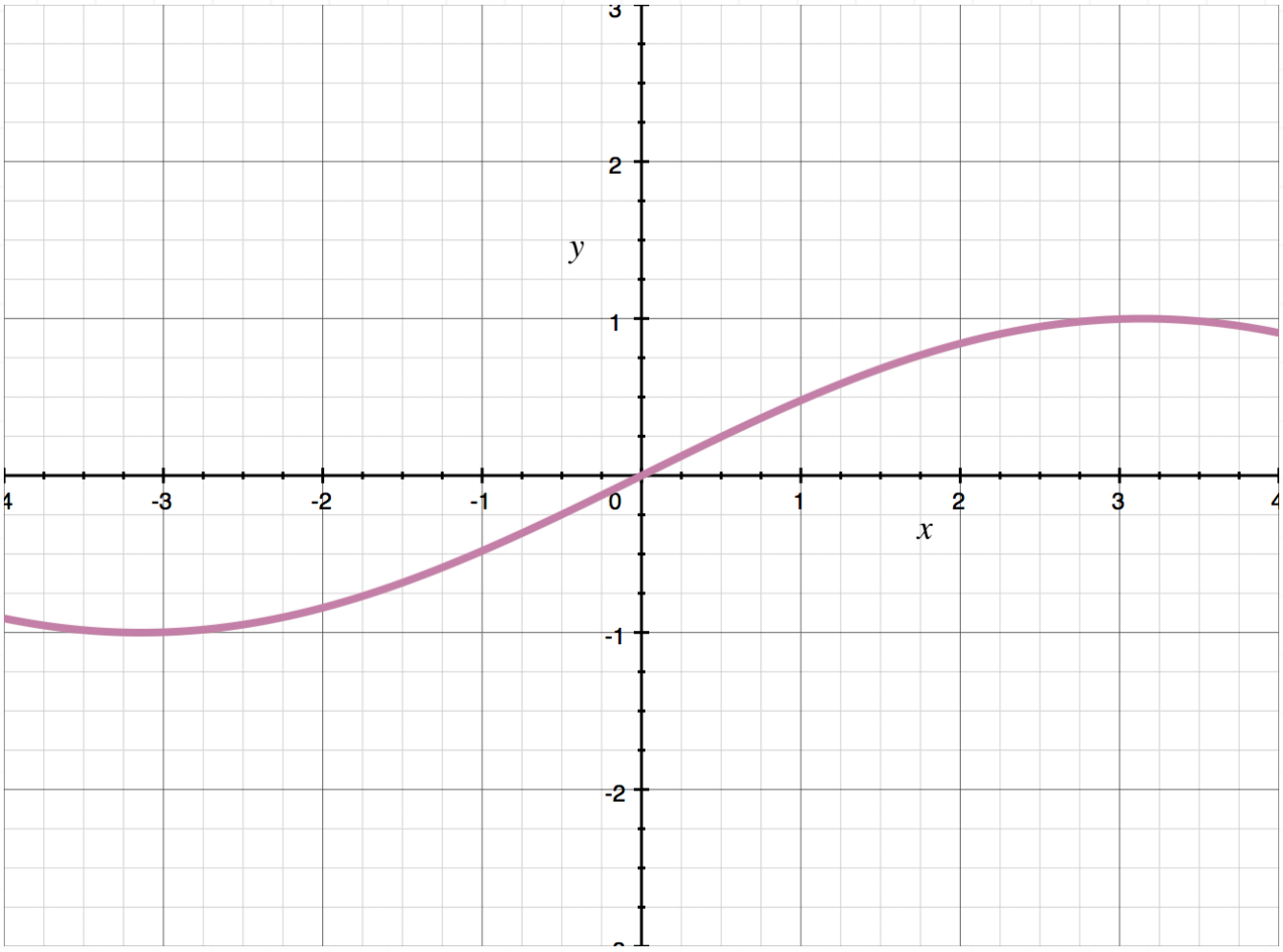
Solve $x = 2t$ for t.

$$t = \frac{1}{2}x$$

Then substitute this into $y = \sin t$ to get an equation for y in terms of x.

$$y = \sin\left(\frac{1}{2}x\right)$$

Sketching this curve gives



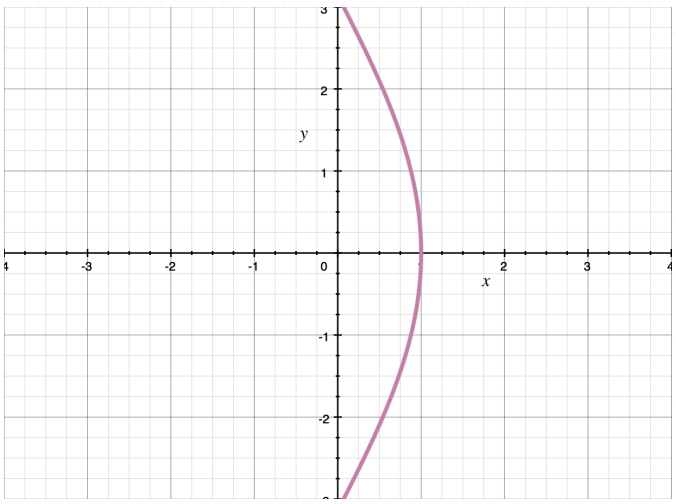
Topic: Sketching the vector equation

Question: Choose the sketch of the vector equation.

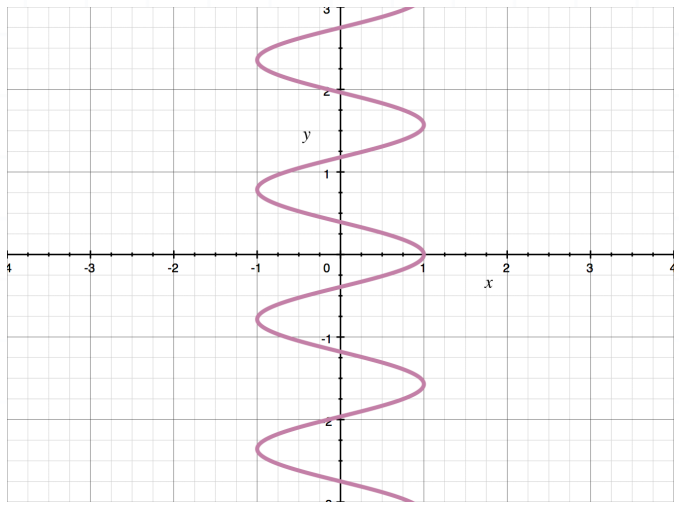
$$r(t) = \left\langle \cos(2t), \frac{1}{2}t \right\rangle$$

Answer choices:

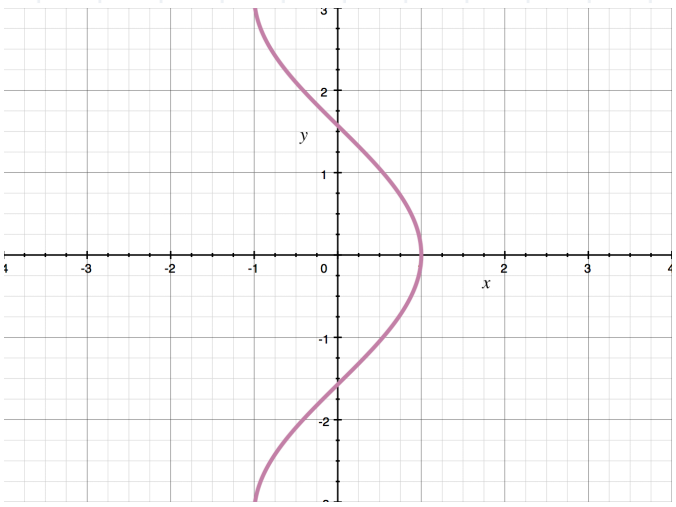
A



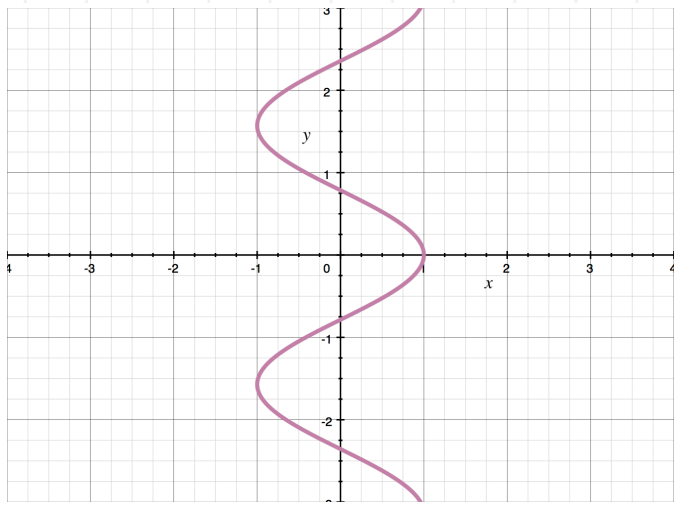
B



C



D



Solution: B

We'll change the vector equation to its parametric form.

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

$$y = \frac{1}{2}t$$

Solve $y = \frac{1}{2}t$ for t.

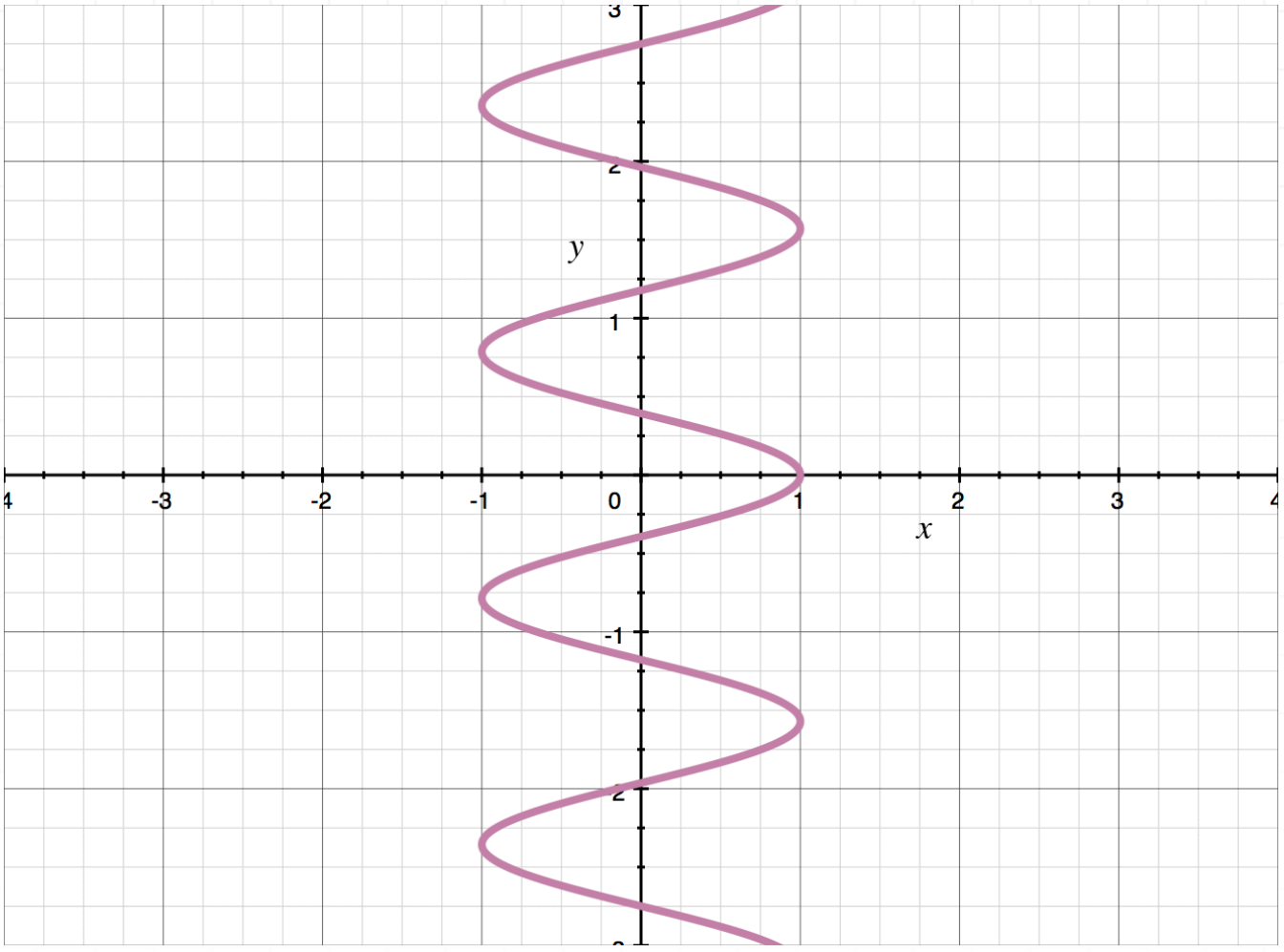
$$t = 2y$$

Then substitute this into $x = \cos(2t)$ to get an equation for x in terms of y.

$$x = \cos\left[2(2y)\right]$$

$$x = \cos(4y)$$

Sketching this curve gives



Topic: Sketching the vector equation

Question: The vector-valued function $\mathbf{s}(t) = 8\cos t\mathbf{i} + 8\sin t\mathbf{j}$ is given on the domain $0 \leq t \leq 8\pi$. Along which shape does the curve lie?

Answer choices:

A A line with slope 4

B A line with slope 8

C A parabola with vertex $(0,8)$

D A circle with radius 8

Solution: D

The parametric equations of the functions are

$$x = 8\cos t$$

$$y = 8\sin t$$

or we could write them as

$$x^2 = 64\cos^2 t$$

$$y^2 = 64\sin^2 t$$

If we add the parametric equations together, we get

$$x^2 + y^2 = 64\cos^2 t + 64\sin^2 t$$

$$x^2 + y^2 = 64(\cos^2 t + \sin^2 t)$$

$$x^2 + y^2 = 64$$

The last equation indicates that the function lies along the circle with radius 8.