

Quiz 11

Clear your desk of everything except pens, pencils and erasers. Show all your work.
If you have a question raise your hand and I will come to you.

- [6 pts.] 1. A particular curve is represented parametrically by

$$x = -5 \cos(5t); \quad y = 6 \sin(5t); \quad t \in \left[0, \frac{\pi}{5}\right].$$

- a). Find the Cartesian equation of the curve.

(3 pts.)

$$-\frac{x}{5} = \cos(5t)$$

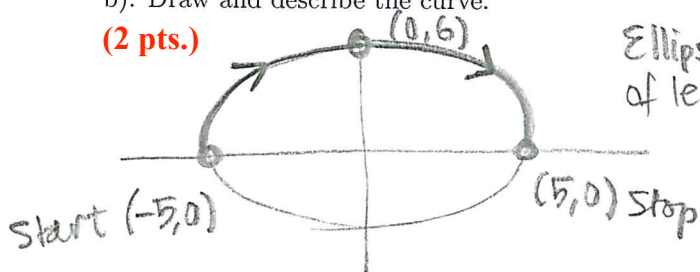
$$\frac{y}{6} = \sin(5t)$$

$$\sin^2(5t) + \cos^2(5t) = 1$$

$$\boxed{\frac{x^2}{25} + \frac{y^2}{36} = 1}$$

- b). Draw and describe the curve.

(2 pts.)



Ellipse w/ axes
of length 5 & 6

Top half of
ellipse

$$t=0 \Rightarrow (x, y) = (-5, 0)$$

$$t = \frac{\pi}{5} \Rightarrow (x, y) = (5, 0)$$

$$t = \frac{\pi}{10} \Rightarrow (x, y) = (0, 6)$$

- c). As t increases from 0 to $\pi/5$, is the movement along the curve clockwise or counter-clockwise?

(1 pt.)

clockwise

- [4 pts.] 2. Find the equation (in x and y) to the line tangent to the curve

$$x(t) = 3e^{5t}, \quad y(t) = (t-8)^2$$

at the point $(x, y) = (3, 64)$.

(1 pt.) $t=0$

$$(2 \text{ pts.}) \quad \frac{dy}{dx} = \frac{dy/dt}{dx/dt} = \frac{2(t-8)}{15e^{5t}}$$

(1 pt.)

$$\left. \frac{dy}{dx} \right|_{t=0} = \frac{-16}{15} \text{ (slope)}$$

$$\Rightarrow \boxed{y-64 = -\frac{16}{15}(x-3)}$$