Practice Questions over 12.1

1. Eliminate the parameter, t, to obtain an equation of the form $y = f(x)$.

a. $x = \sqrt[3]{t-1}$, $y = \cos t$ (There is no new domain restriction.)

b. $x = \sqrt[3]{t-1}$, $y = \cos \sqrt[3]{t-1}$ (There is no new domain restriction.)

c. $x = -\sqrt{t}$, $y = -3\sqrt{t} + 6e^{\sqrt{t}}$ (Specify the domain restriction.)

d. $x = -\sqrt{t}$, $y = 2t + 1$ (Specify the domain restriction.)

e. $x = e^{-t}$, $y = 7e^{-3t}$ (Specify the domain restriction.)

f. $x = 4\sin t$, $y = 3 + 4\cos t$ 

g. $x = 3\sin t$, $y = 3 - 6\cos t$ 

h. $x = 3\cos t$, $y = 3 - 9\cos^2 t$

2. Write a set of parametric equations $x = f(t)$, $y = g(t)$ for the curve

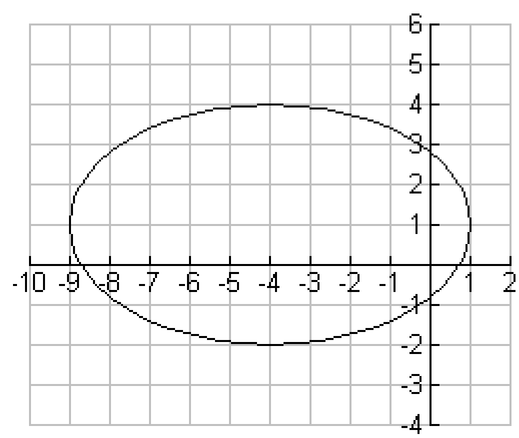
a. $x = 4y^5 - 3y^2 + 2\cos y - e^{7y}$

b. The circle $(x-1)^2 + (y+2)^2 = 49$

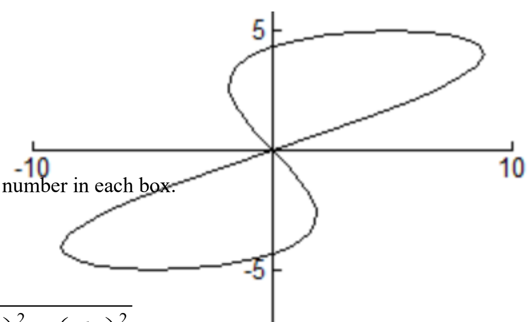
c. The ellipse $\dfrac{(x-5)^2}{9} + \dfrac{(y+2)^2}{4} = 1$

d. The ellipse shown with the initial value of $t = 0$, $x = 1$, $y = 1$ traveling counterclockwise. Report the center, RUN, RISE, and vertices. Also report implicit form.

e. The same ellipse shown to the right with the initial value of $t = 0$, $x = -4$, $y = -2$ traveling clockwise.



3. The graph of the parametric equations $x = 5\sin t - 5\sin 2t$ and $y = 5\sin t$ is shown for $0 \le t \le 2\pi$.



a. Evaluate $\dfrac{dy}{dx}$ at the origin when $t = 0$. $\dfrac{dy}{dx} = \square$

b. Evaluate $\dfrac{dy}{dx}$ at the origin when $t = \pi$. $\dfrac{dy}{dx} = \square$

Write a number in each box.

c. The arc length from $t = 0$ to $t = 2\pi$ of this curve is given by $\displaystyle\int_0^{2\pi} \sqrt{\left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2}\, dt$.

Complete the boxes to set up the integral to find the arc length. You need not simplify. Then use FNINT to find the arc length rounded to the nearest whole number.

$$\int_0^{2\pi} \sqrt{\square}\, dt \approx \square$$