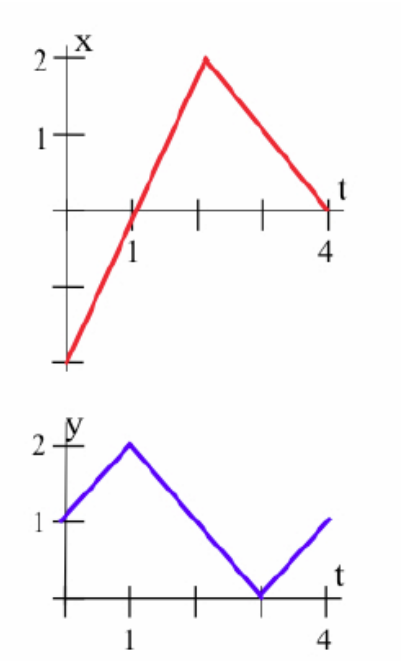
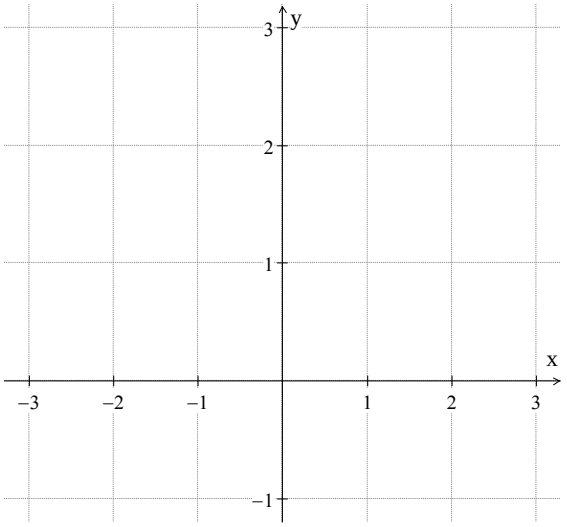
Activity - Parametric Equations Name_____

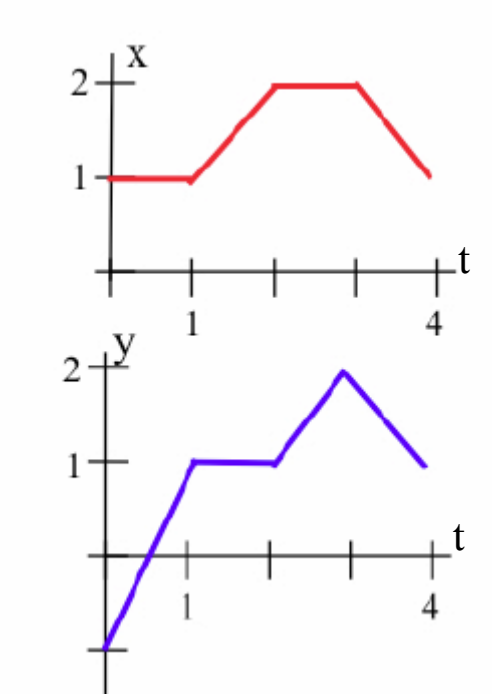
1. Use the values for $x(t)$ and $y(t)$ for the curves below to sketch the graph on the x-y plane.

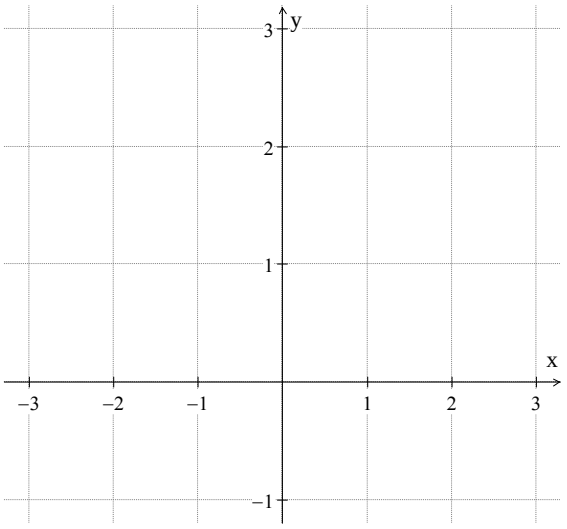
a)



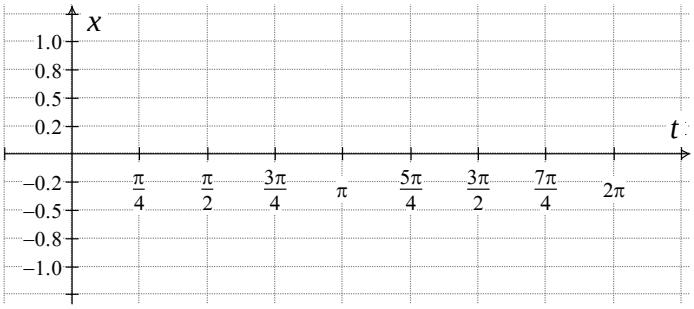


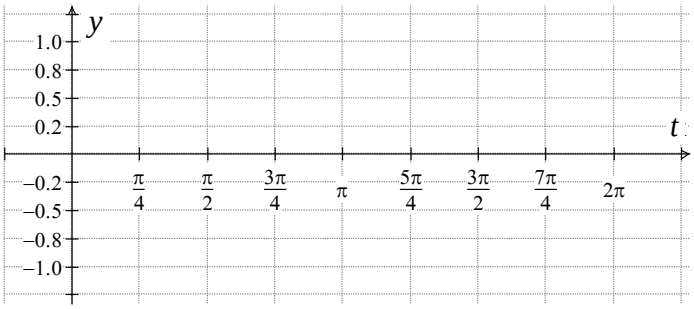
b)

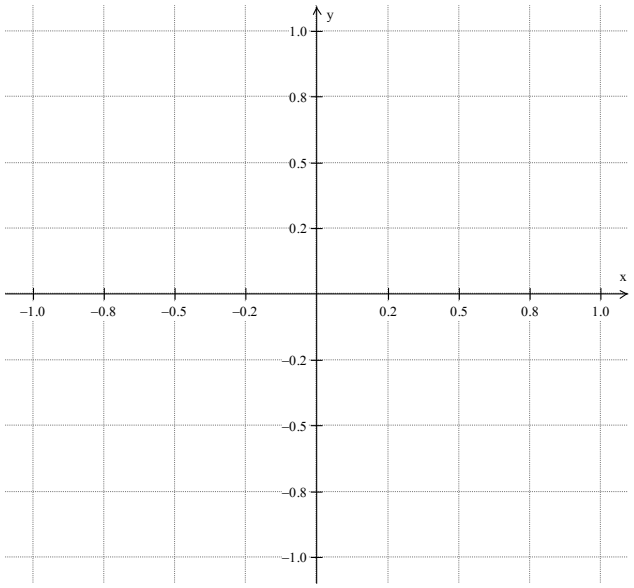




2. Graph the equations $x = \cos t,\ y = \sin t$ on the *x*-*t* and *y*-*t* planes below and then on the *x*-*y* plane.







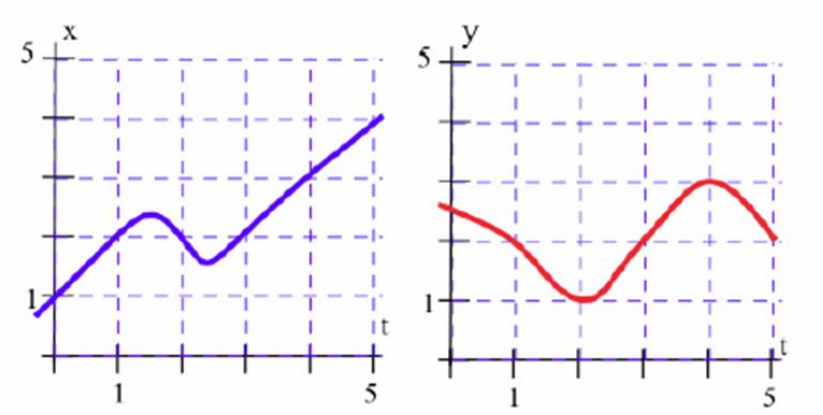
3. a) Find the equation of a line that is tangent to the curve on the x-y plane above when $t = \dfrac{\pi}{3}$.

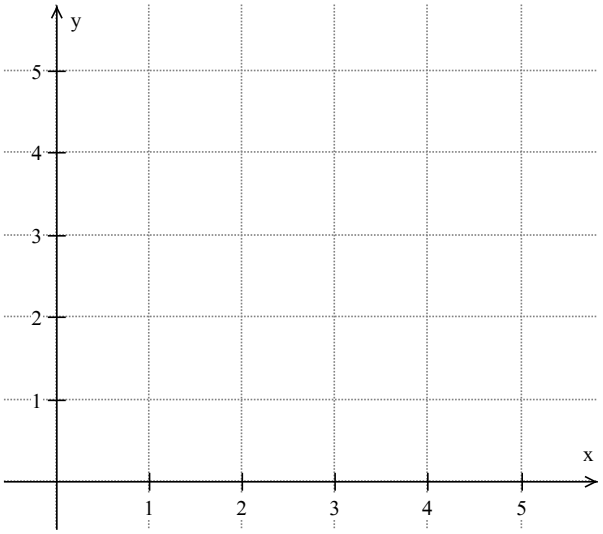
b) Find the equation of a line that is normal (perpendicular) to the curve at this same point.

c) Draw these lines on your graph. Does the normal line go through the center of the circle?

Do you think all lines normal to the circle go through the center? Why or why not?

4. Given the graphs of $x(t)$ and $y(t)$ below:





a) Sketch the graph $(x(t),y(t))$ in the x-y plane.

b) Label the point where t = 1 **A**, and the point where $t = 3$ **B**.

c) Find the slope of the tangent lines to the graph when $t = 1$ and $t = 3$.

d) Using the two graphs given:

When does the $\frac{dx}{dt} = 0$? When does $\frac{dy}{dt} = 0$?

e) Locate the points that correspond to these t values on the graph in the x-y plane. Label the places where $\frac{dx}{dt} = 0$ with a **V** and places where $\frac{dy}{dt} = 0$ with an **H**.

f) What can you conclude about the connection between the points where the slopes of $x(t)$ and $y(t) = 0$ and the resulting x-y graph? Explain why this would be the case.