Assignment #2

Due on Wednesday, February 6, 2019

Read Section 3.1, on *Parametrized Curves in the Plane,* in the class lecture notes at `http://pages.pomona.edu/~ajr04747/`

Do the following problems

1. A curve C in the xy–plane is parametrized by the equations

$$x(t) = t + 2 \quad \text{and} \quad y(t) = -t + 1, \quad \text{for } t \in \mathbb{R}.$$

   Sketch the graph of C.

2. A curve C in the xy–plane is parametrized by the equations

$$x(t) = \cos t \quad \text{and} \quad y(t) = \sin t, \quad \text{for } 0 \leqslant t \leqslant \pi$$

   Sketch the graph of C.

3. Suppose that $(x(t), y(t))$ solves the system of differential equations

$$\begin{cases} \dfrac{dx}{dt} &= 2; \\ \dfrac{dy}{dt} &= 1, \end{cases}$$

   subject to the initial conditions $x(0) = x_o$ and $y(0) = y_o$, for some given real numbers x_o and y_o.

   Find $x(t)$ and $y(t)$, for all t, and sketch the graph of the parametrized curve that these functions determine.

4. For each of the given parametrized curves, $(x(t), y(t))$, compute the derivatives $(x'(t), y'(t))$.

   (a) $(x(t), y(t)) = (t, t^2)$, for all $t \in \mathbb{R}$.

   (b) $(x(t), y(t)) = (t\cos t, t\sin t)$, for all $t \in \mathbb{R}$.

5. Given that $(x'(t), y'(t)) = (1, 2t)$, for all t, and that $(x(0), y(0)) = (1, 1)$, compute $(x(t), y(t))$, for all $t \in \mathbb{R}$, and sketch the graph of the parametrized curve.