ESP Math 182

Worksheet 18

Spring 2019

9 April 2019

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1. **Warm up:** Answer the following warm up questions.

   (a) What is a parametric function?

   (b) What is the parametric form for the circle $x^2 + y^2 = r^2$?

   (c) What does the parametric function $(x, y) = (t, t/|t|)$ look like?

2. Express the following functions in the form $y = f(x)$ by eliminating the t parameter.

   (a) $x = t$
   $y = \tan^{-1}(t^3 + e^t)$

   (c) $x = e^{-2t}$
   $y = 6e^{4t}$

   (b) $x = t + 3$
   $y = 4t$

   (d) $x = t^2 - 4t + 5$
   $y = t - 2$

3. A particle is traveling around a circle of radius r whose shape is described by the parametric curve $c(t) = (x, y) = (r\cos(\omega t), r\sin(\omega t))$ for some constant ω, which indicates speed.

   (a) Find the value $\frac{dy}{dx}$ of the particle. This isthe *speed* of the particle.

   (b) Find the value $\frac{d^2y}{dx^2}$ of the particle. This is the *acceleration* of the particle.

4. Consider the circle $x^2 + y^2 = 1$.

   (a) Describe a parametrization of the circle such that $(x, y) = (1, 0)$ at $t = 0$ and $t = \pi$.

   (b) Describe a parametrization of the circle such that $(x, y) = (\sqrt{2}/2, \sqrt{2}/2)$ at $t = 0$.

   (c) Suppose you are given three different numbers a, b, c. Does there exist a paramterization of the circle such that $(x, y) = (1, 0)$ at $t = a, b, c$?

5. Consider the parametric curve $(x, y) = (\pi \sin(t + \pi), \sin(t))$.

   (a) What is the length of the curve from $t = 0$ to $t = \pi/2$?

   (b) Give the curve in rectangular coordinate form $y = f(x)$.

   (c) Give the curve $y = 5x$ as a parametric curve with $x = \sin(t)$.