**ESP Math 182** **Spring 2015**

# Worksheet 27

21 April 2015

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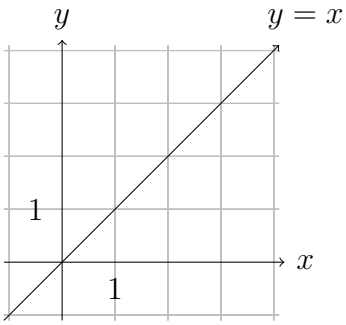
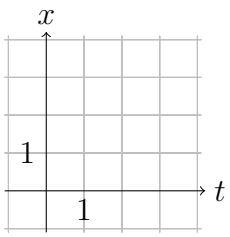
1. **Warm up:**

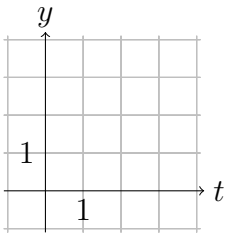
   (a) Describe the expression "parametric equation" in your own words.

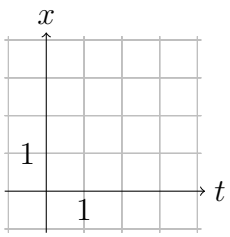
   (b) Can every function be expressed as a parametric equation? If not, try to think of an example that won't work.

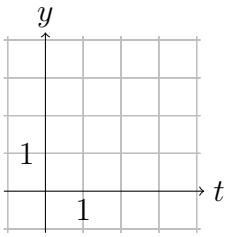
   (c) Consider the function $y = x$, or $f(x) = x$, given on the left below. Draw three different pairs of parametric equations $x = a(t)$ and $y = b(t)$, and write the functions, that describe $y = f(x)$.

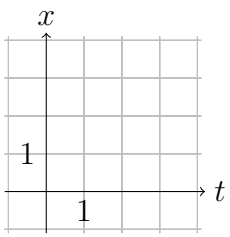


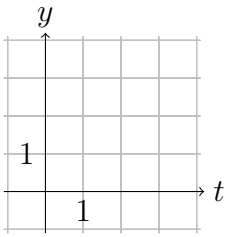



2. Express the following in the form $y = f(x)$ by eliminating the $t$ parameter.

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

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

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

   (d) $x = \ln(t)$
   $y = 2 - t$

3. Find parametric equations for the curves described below.

   (a) The line of slope 8 through the point $(-4, 9)$.

   (b) The line through $(2, 5)$ perpendicular to $y = 3x$.

   (c) The curve $y = \cos(x)$ translated so that a maximum occurs at $(3, 5)$.

4. A particle is traveling around a circle of radius $r$ whose shape is described by the parametric curve $c(t) = (x, y) = (r\cos(\omega t), r\sin(\omega t))$.

   (a) What is the speed $\frac{dy}{dx}$ of the particle?

   (b) What is the acceleration $\frac{d^2y}{dx^2}$ of the particle?