Lesson Plan 19 Trigonometric Identities IV Parametric Equations,
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1) Attendance
2) Questions on Homework so far?

PARAMETRIC EQUATIONS

If f and g are functions on an interval I, then the points $(f(t),g(t))$ is a plane curve.

The equations:

$x = f(t)$ $y = g(t)$ where $t \in I$, are PARAMETRIC EQUATIONS for the curve, with parameter t.

Example:

$$x = t^2 - 3t$$
$$y = t - 1$$

t	x	y
-2	10	-3
-1	4	-2
0	0	-1
1	-2	0
2	-2	1
3	0	2
4	4	3
5	10	4

GRAPH THIS

Note that the equations are not unique. If you substitute:

$t + 1$ for t or even t^2+t-5 the graph is the same:

Example: Removing the parameters:

$x = t^2 - 3t$
$y = t - 1$

$t = y + 1$
$x = (y+1)^2 - 3(y+1) = y^2 - y - 2$

Example Modeling Circular motion:

$x = \cos t$
$y = \sin t$

We can remove the t as follows:
Square both equations and add

$x^2 + y^2 = \cos^2 t + \sin^2 t = 1$

Which is the equation of the unit circle

Example:

$x = \sin t$
$y = 2 - \cos^2 t$

square the first equation and subtract from the second giving

$y - x^2 = 2 - \cos^2 t - \sin^2 t = 1$
$y = x^2 + 1$

Which is a parabola with vertex at (1,0)

Finding a parametric equation:

Find equations for line that goes through point (2,6) with slope 3:

x = 2 + t
y = 6 + 3t

Removing the t we find that $y=3x$

The graphing Calculator can be used to show a curve using parametric equations:

Mode - PAR

Elipse
$x=3\cos(t)$
$y=2\sin(t)$

Lissajous figures
$x=\sin(2t)$
$y=2\cos(t)$

$x=\sin 3t$
$y=2\cos t$

Form of a Polar equation:

$r = \theta$

$x = t \cos t$
$y = t \sin t$