CH 10.2 CALCULUS w/ PARAMETRIC CURVES

GOAL: We will learn how to find derivatives of parametric curves in order to find TANGENT LINES to the curves.

PART 1: SLOPE of A PARAMETRIC CURVE

! dy/dx = SLOPE

Consider the parametric curve:
Where y is also a differentiable function of x. Notice:

* This allows us to the the SLOPE of the TANGENT LINE to a parametric curve at a given point without ever having to eliminate the parameter "t".

NOTE:

THE EQUATION of A TANGENT LINE:

!

PART 2 EXAMPLES

Ex 1. Consider the PARAMETRIC CURVE:

$$(x,y)=(2+t^2,\ t+t^2)$$

- Find the direction of increasing "t" values
- Find dy/dx in terms of "t"
- Find the equation of the TANGENT LINE to the curve at the point (3,0).
- Find the coordinates of points on the curve where the tangent is horizontal and vertical.

Sol:

Ex2. Find the equation of the TANGENT LINE to the parametric curve when $t=1$

$$(x,y) = (t^2+4t,\ 2+1/t)$$

sol:

Ex3. Find the equation of the TANGENT LINE to the parametric curve at the point (0,0)

$$(x,y) = (2\sin(t),\ 2t+t^2)$$

sol:

Ex 4: For the following parametric curve, at what points does the **TANGENT LINE** to the curve have slope 1?

$$(x,y) = \left(\frac{8t^3}{3}+5,\ 18t^2-16t+1\right)$$

sol:

Ex 5. Show that the following parametric curve has two **TANGENT LINES** at the point (0,0) and find equations of both of them.

$$(x,y) = (2\sin(\theta),\ \cos(\theta)\sin(\theta))$$

sol: