

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

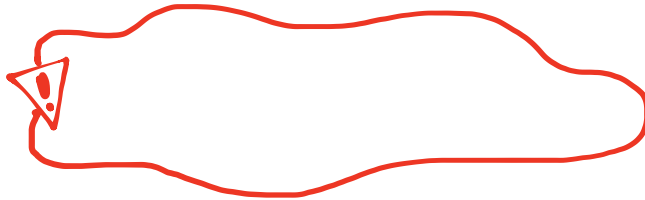
$$\frac{dy}{dx} = \text{SLOPE}$$

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

* This allows us to find 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 $\frac{dy}{dx}$ 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 $t=1$

$$(x,y) = (t^2+4t, 2+\frac{1}{t})$$

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: