MATH 121

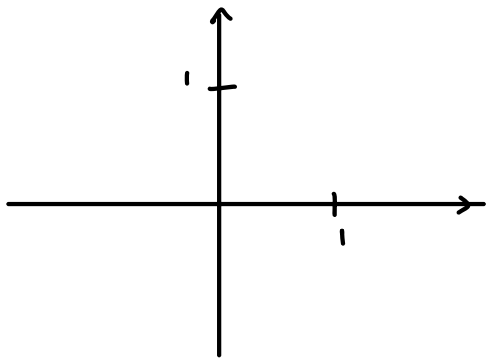
IMPLICIT DIFFERENTIATION

GOALS

- ☐ PERFORM IMPLICIT DIFFERENTIATION USING ALL OF OUR DERIVATIVE RULES
- ☐ COMPUTE $\frac{d^2y}{dx^2}$
- ☐ USE IMPLICIT DIFFERENTIATION TO FIND AN EQUATION FOR THE LINE TANGENT TO A CURVE AT A GIVEN POINT

* "IMPLICIT" REFERS TO THE FACT THAT WE'LL TREAT y LIKE A FUNCTION OF x, EVEN IF IT ISN'T.

e.g. $x^2 + y^2 = 1$



Ex: $x^3 + y^3 - 2xy = 0$

Ex: $(x^2 + y^2 - 1)^3 - x^2 y^3 = 0 \; ; \; P(-1, 1)$

Ex: $x^4 - x^2 y^3 + y^4 = 1$; $P(-1, 1)$

Ex: $x^2 \cos y + x^3 \sin(2y) = 1$ $P(1, 0)$

COMPUTING $\frac{d^2y}{dx^2}$

* SINCE $\frac{dy}{dx}$ IS IN TERMS OF x AND y, WE CAN WRITE $\frac{d^2y}{dx}$ IN TERMS OF x AND y, TOO.

EX: $x^2 - xy + y^2 = 1$