

## Monday Night Calculus

### Implicit Differentiation

10/26 Question

- Let  $y = \tan^{-1} x$ 
  - Find a formula for the derivative of the arctangent function, that is, find an expression for  $\frac{dy}{dx}$ .
  - Graph the arctangent function and its derivative in the same viewing window. Describe the relationship between the two graphs.
- Find  $\frac{dy}{dx}$  by implicit differentiation.
  - $\sin(xy) = 1 + \cos y$
  - $e^y \cos x = x + \cos y$
- Find an equation of the tangent line to the curve at the given point.  
 $x^2 + y^2 = (2x^2 + 2y^2 - x)^2 \quad (0, -\frac{1}{2})$
- The graph of the equation  $y^2 = x^3 + 3x^2$  is called the Tschirnhausen cubic.
  - Find an equation of the tangent line to this graph at the point  $(1, -2)$ .
  - Find the points on this graph where the tangent line is horizontal.
  - Graph the Tschirnhausen cubic and the horizontal tangent lines in the same viewing window.