

## Implicit Differentiation

p. 232 - 238 (3.6)

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1. Differentiate both sides with respect to  $x$ .
  2. Collect  $\frac{dy}{dx}$  terms on one side = all other terms on the other side
  3. Factor out  $\frac{dy}{dx}$ .
  4. Solve for  $\frac{dy}{dx}$ .
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1. Find  $\frac{dy}{dx}$  for  $y^4 + x^3y^5 - 2x^7 = 13$ .

2. Find the line of tangency and normal line to the curve  $x^2 - xy + y^2 = 7$  at the point  $(-1, 2)$ .

3. Find the instantaneous rate of change at  $(1, 1)$  for  $x + 3xy - 2y^2 = 2$ .

\*\*4. If  $x^2 + y^2 = 25$ , what is the value of  $\frac{d^2y}{(d(x))^2}$  at the point  $(4, 3)$ ?

## Implicit Differentiation Notes

Find  $y'$  for questions 1 & 2.

1.  $-4 = y^3 + y^2 - 5y - x^2$

2.  $2y = x^2 + \sin(y)$

3. Find the equation of the tangent line to  $(x(y))^2 = 1$  at  $(1, -1)$ .

4. Find  $\frac{dy}{dx}$  for  $\ln(xy) = e^{2x}$ .

5. Find the instantaneous rate of change for  $x^2 + 2xy + y^2 = 4$  at  $(1, 1)$ .

6. For  $\frac{x - 1}{x + 1} = y^2$ , find  $y'$ .

7. Find  $y'$  for  $x + \tan(xy) = 0$ .

8. Find  $y''$  for  $x^2 + y^2 = 1$