

## Computer Lab #2

(due June 1, 2020)

### Important things to know for this assignment

- Here's how you can find the derivative of an implicit equation:

`ImplicitDerivative(x^2+y^2-y^3)` ← This finds  $\frac{dy}{dx}$  for  $x^2 + y^2 = y^3$

`ImplicitDerivative(ImplicitDerivative(x^2+y^2-y^3))` ← This finds  $\frac{d^2y}{dx^2}$

- Here's how you can graph an implicit equation:

`x^2+y^2=y^3` ← This graphs  $x^2 + y^2 = y^3$

- Here's how you can graph approximating rectangles:

`f(x)=x^2` ← This graphs  $f(x) = x^2$

`RectangleSum(f,0,2,4,0)` ← This shows 4 rectangles under  $f$  on  $[0,2]$  using left endpoints

`RectangleSum(f,0,2,4,0.5)` ← This shows 4 rectangles under  $f$  on  $[0,2]$  using midpoints

`RectangleSum(f,0,2,4,1)` ← This shows 4 rectangles under  $f$  on  $[0,2]$  using right endpoints

- Here's how you can evaluate an integral:

`Integral(f,0,2)` ← This evaluates  $\int_0^2 f(x) dx$  and shows the "area under the curve"

See Lab #1 for more directions.

- Consider the implicit equation  $x^3 + y^3 = 3xy$ .
  - Use implicit differentiation to find  $\frac{dy}{dx}$  by hand.
  - Now use GeoGebra to find  $\frac{dy}{dx}$ .
  - Find the equation of the tangent line at  $(\frac{3}{2}, \frac{3}{2})$  by hand.
  - Use GeoGebra to graph the curve and the tangent line that you found for part (c) on a single coordinate system with  $-5 \leq x < 5$ , and  $-5 \leq y \leq 5$ .
  - Now use GeoGebra to find  $\frac{d^2y}{dx^2}$ .
- Consider the function  $f(x) = \frac{1}{30}x^2 + \sin x - 1$ .
  - Use GeoGebra to graph  $f(x)$ . Use rectangles to approximate the integral  $\int_0^{10} f(x) dx$  given each of the following conditions. Be sure to graph the rectangles in each case.
    - 10 rectangles using right endpoints
    - 100 rectangles using right endpoints
    - 200 rectangles using right endpoints
    - 10 rectangles using midpoints
    - 100 rectangles using midpoints
  - Evaluate  $\int_0^{10} f(x) dx$  by hand.
  - Now use GeoGebra to evaluate  $\int_0^{10} f(x) dx$ .