

# Worksheet 5

SI with Ian

Week of February 24th

Feel free to use notes and other resources, however, please do not use online calculators. Also if you are printing this worksheet out before hand (thank you) please wait to complete the worksheet until the SI session.

## 1 Session Problems

1. How are continuity and differentiability related?
  - Similarly if  $f$  is not differentiable at some point  $a$ , what is happening graphically at  $a$ ?
  - If  $f$  is continuous do we know that it's differentiable?
2. The equation of a particle in motion is given by  $s = t^3 - 3t$ , where  $s$  is in meters and  $t$  is in seconds. Note that velocity is the first derivative of  $s$ , and acceleration is the second derivative of  $s$ .
  - (a) Find the velocity and acceleration as functions of  $t$ .
  - (b) Find the acceleration after 2 seconds.
  - (c) Find the acceleration when the velocity is 0.

Differentiate the given function

3  $y = 6 + 4\sqrt{x} \csc(x)$

4  $Z(v) = \frac{v + \tan(4 + 10v)}{1 + \csc(v)}$

5 Find the derivative of the function  $f(x) = \frac{1 - xe^x}{x + e^x}$

- 6 Find the equation of the tangent line to the curve  $y = 2x\sin(x)$  at the point  $(\frac{\pi}{2}, \pi)$

## 2 Challenge Problems

- 7 Find the derivative of:  $f(x) = |x|$
- If you have time graph  $f(x)$  and  $f'(x)$  and examine the relationship between.