

# Worksheet 2

SI with Ian

Week of February 3rd

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.

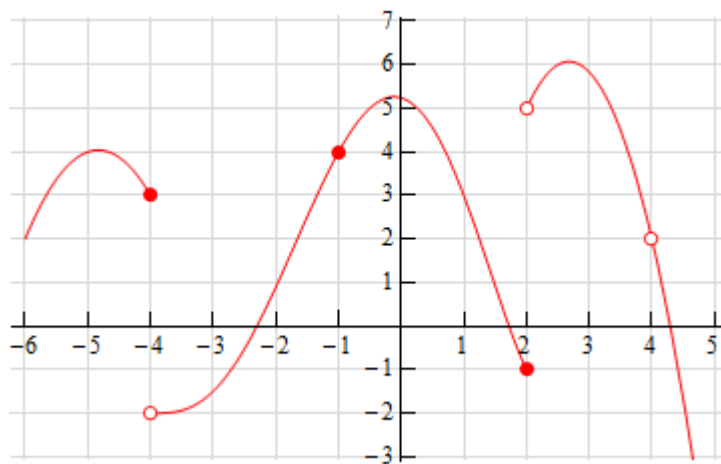
## 1 Session Problems

1. Suppose an airplane is flying from Denver, CO to New York, NY. The pilots take note that after 2.4 hours of flying they have covered 1,250 miles. Find their average velocity over that period of time.

2. Find  $\lim_{x \rightarrow 4} \frac{x^3 - 4x^2}{x^2 - 16}$

3. Where are  $f(x) = e^x$  and  $g(x) = \sqrt{x}$  both continuous? Express your answer in interval notation.

4. Where on the following graph is  $f(x)$  continuous?



5. Find  $\lim_{x \rightarrow 1} \frac{\sqrt{5x+4} - 3}{x-1}$

## 2 Challenge Questions

1. A tank contains 5000L of pure water. Brine that contains 30g of salt per liter of water is pumped into the tank at a rate of 25L/min.

(a) Show that the concentration of salt after  $t$  minutes (in grams per liter) is:

$$C(t) = \frac{30t}{200+t}$$

(b) What happens to the concentration as  $t \rightarrow \infty$

2. Find the values of  $a$  and  $b$  that make  $f$  continuous everywhere.

$$f(x) = \begin{cases} \frac{x^2 - 4}{x - 2} & x < 2 \\ ax^2 - bx + 3 & 2 \leq x < 3 \\ 2x - a + b & x \geq 3 \end{cases}$$