WORKSHEET 1: 18 points

Math 6B-030, Spring 2021

Due: Friday, April 9th, 11:59pm via Gradescope

Instructions: *Submit your completed worksheet to www.Gradescope.com. Log in with your UCRNetID@ucr.edu email and going to the assignment. Write your solutions to each question on a different paper, clearly labeling each question. Scan your work with a scanner or (free) scanning app to upload a* **pdf (not images)** *of your work to Gradescope.*

Question 1 (7 points) To get a deeper understanding of functions in 6A, we described functions using the RULE OF FOUR (*visual, numeric, symbolic, & verbal*). A function is described verbally below. Describe the same function *numerically, symbolically, & visually*.

The population of Rabbits in Rabbitville is 70 on January 1, 2010. Every year, the population doubles. Let $R(t)$ be the number of cats in Rabbitville t years since January 1, 2010.

(a). (1 point) Numerically. Give a table of values for R(t) for at least 3 values of t.

(b). (1 point) Symbolically. Write an equation for R(t).

(c). (2 points) Visually. Graph $R(t)$. Label your graph carefully, including coordinates for 3 points.

(d). (2 points) What is the average rate of change (ARoC) of $R(t)$ from: (i). $t = 0$ to $t = 2$? (ii). $t = 2$ to $t = 4$? Answer symbolically using function notation and numerically (you may use a calculator).

(e). (1 point) How does the ARoC change between those two intervals as t increases? What is the concavity of R?

Question 2 (4 points) In parts (a) and (b), sketch the given function. On each graph, label the interval(s) (if any) where the function is: (i) increasing, (ii) decreasing, (iii) concave up, (iv) concave down, (v) inflection points.

(a). (2 points) $(x+4)^2$

(b). (2 points) $-(x+4)^2$

Question 3 (7 points) Sketch functions with the described behavior. **Carefully label all graphs with axes, function names, and other relevant information.**

(a). (2 points) Sketch a function $a(x)$ that decreases on $(-\infty, -3)$ and increases on $(-3, \infty)$.

(b). (2 points) Sketch a function $b(x)$ that decreases on $(-\infty, -3)$ and increases on $(-3, \infty)$. Does b have an inflection point? If not, why not? If so, why and where?

(c). (3 points) Sketch a function $c(x)$ that decreases at a increasing rate. What is the concavity of c? In other words, as x increases, $c(x)$ decreases and the average rates of change of $c(x)$ increase (for a fixed, arbitrarily small interval length).