WORKSHEET #9
Math 6A20, Fall 2020

Name: Jaqueline Martinez   **Group Name:** 1

Instructions. You are encouraged to <u>work with</u> (**not copy**) your group, but each of you will turn in your own worksheet by the end of the day (11:59 pm) via Gradescope. You may ask the TA a few questions, which the TA will answer with leading questions (not answers) to help guide you. Worksheet is **15** points (*-2 for unclear submissions*). * SHOW and JUSTIFY all work (including work done "in your head") on ALL questions. * Log in to www.Gradescope.com with your UCRNetID@ucr.edu email to submit your worksheet.

Instructions for clear submissions are the same as for previous worksheets.

· ·

Question 1 (7 points) Suppose you open an account at Año Bank on January 1, 2021. Interest is compounded yearly and t years later your account will have $A(t) = 200(1.015)^t$ dollars.

(a). (1 point) What does $200 represent? What is the interest rate (as a percent)?

The $200 represents the amount of money that was first put into the bank. $A(0) = 200$

(b). (1 point) How much is in the account on January 1, 2022? *Simplify as much as possible.*

$A(1) = 200(1.015)^1$ There is $203 in Jan 1, 2022.

$\hookrightarrow 200(1.015) \rightarrow 203$

(c). (1 point) Suppose $A(m) = 210$. Verbally explain what m means in this context and approximate m up to 2 decimals by graphing (eg on Desmos).

$A(m) =$ amount of time in years

$\hookrightarrow$ assuming that

(d). (1 point) What does $A^{-1}(200)$ mean in this context and (without using any tools) what does it equal? Be precise and include units.

$A^{-1}(200)$ if it were to decrease.

(e). (2 points) On January 1, 2021, suppose you also open an account at Mes Bank with $150 and an annual interest rate of 4.5% compounded monthly. Write an equation for the amount of money, $M(t)$, you have in that account t years after January 1, 2021.

$M(t) = 150(1.045)^t$

(f). (1 point) What is the APY for: $A(t)$? $M(t)$?

$A(t) = 4.5\_\_\_$

$M(t) = 4.5\_\_\_$

Question 2 (8 points) Let $a(x) = \underline{5^x}$, $b(x) = (\frac{1}{5})^x = 0.2^x$, $c(x) = 3(5^x)$, and $d(x) = a^{-1}(x)$.

(a). (1 point) What transformation can you perform on $a(x)$ to get $b(x)$? Describe precisely *verbally* and *algebraically*.

$$a(x) = 5^x$$
$$b(x) = (\tfrac{1}{5})^x$$

$x = 5^y \qquad = y = \frac{1}{5}^x$

From the equations I know that b is an inverse function of a. This is why I changed my variables to proof that the function a can be b.

(b). (1 point) What is the domain and range of $a(x)$? How does this tell you the domain and range of $d(x)$? **Tip:** Can a can attain any: positive number? negative number?

$a(x) = 5^x$ $\qquad$ $d(x) = a^{-1}(x)$

D: $(-\infty, \infty)$ $\qquad$ This shows me the inverse of $a(x)$.

R: $[0, \infty)$

(c). (1 point) Evaluate $a(0)$ and $d(1)$. How can you find $d(1)$ without a calculator?

$a(x) = 5^x$ $\qquad\qquad$ $d(x) = a^{-1}(x)$

$a(0) = 5^0 = 1$ $\qquad\qquad$ $d(1) = a^{-1}(1) = 0.2$

a is an exponent therefore a^{-1} would still have an exponent. It would be 0.2

(d). (1 point) What is the 1-unit scale factor for c? How does this relate to: $\dfrac{c(13.2)}{c(12.2)}$ and $\dfrac{c(x+1)}{c(x)}$?
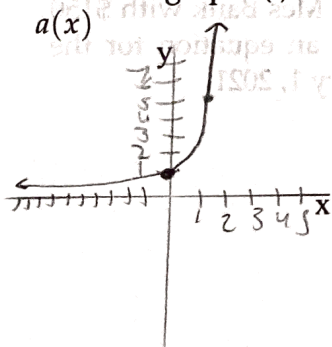
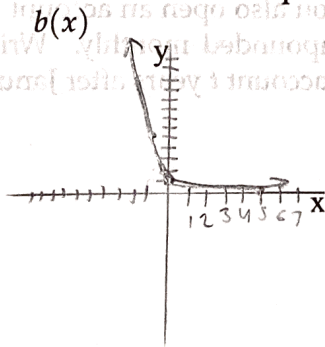$\dfrac{c(13.2)}{c(12.2)} = 5$ $\qquad$ $\dfrac{c(0+1)}{c(0)} = 5$ $\qquad$ The 1 unit scale factor for c would be 5. This relates to both equations since it will always equal to 5 for the 1-unit scale.
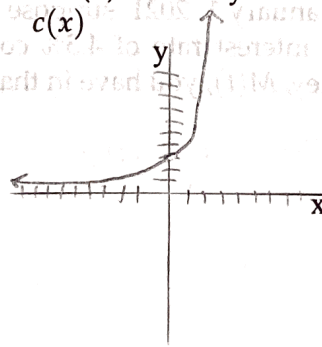
(e). (4 points) *Visually* depict (graph) a, b, c, d on the axes below WITHOUT any tools. For each graph: (i). label the coordinates of 2 points and (ii). correctly illustrate the curve's shape.
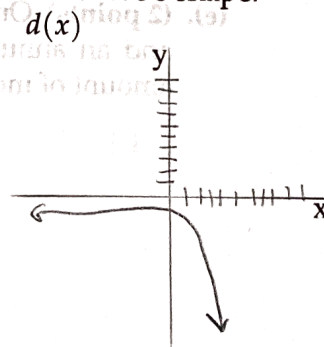
$a(x)$ $\qquad\qquad$ $b(x)$ $\qquad\qquad$ $c(x)$ $\qquad\qquad$ $d(x)$

$5^0 = 1$
$5^1 = 5$
$5^2 = 25$

$(\tfrac{1}{5})^0 = 1$
$(\tfrac{1}{5})^1 = 0.2$
$(\tfrac{1}{5})^5 = 0$

$(\tfrac{1}{5})^{-1} = 5$
$3(5^0) = 3$
$3(5^1) = 15$
$3(5^{-1}) = 0.6$

inverse of $a(x)$