WORKSHEET #7
Math 6A30, Fall 2020

Name: Joaquin Martinez **Group Name:** _____

Instructions. You are encouraged to work with **(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.

Log in to www.Gradescope.com with your UCRNetID@ucr.edu email to submit your worksheet.

Instructions for clear submissions. If you can, write on the worksheet. If you cannot, then write your solutions to page 1 of the worksheet on one paper and your solutions to page 2 of the worksheet on a second paper. Clearly label each question. **Scan** your work with a scanning tool to **pdf** and upload it to Gradescope. **Your submission should be clear, easy to read, no shadows with each of your pages submitted to the correct page on Gradescope.** If it is not, then resubmit. Worksheet is **15** points *(-2 for unclear submissions).*

Question 1 (12 points) Fill-out the chart on the other side for function, $g(x)$. Draw the graphs and write the corresponding algebraic expressions using the function notation $g(x)$. *Hint: Use this Desmos module to help you determine the algebraic representation for each transformation:*
Desmos Module: https://www.desmos.com/calculator/xxukhfbb9f
Activity with TA: Do the starred ($\star$) transformations on STRETCH all together.

Question 2 (3 points) Answer these questions about a general function, $f(x)$. You may find it helpful to use this Desmos module, which was made for $g(x)$ on the back of this worksheet:

(a). (1 point) What transformations were done to go from $f(x)$ to $3f(x) - 2$?
List them in the order in which they were done and be specific.

(i). The stretching would go first. 3 before the $f(x)$. $3f(x)$ b/c or else it would have been $3(f(x)-2)$

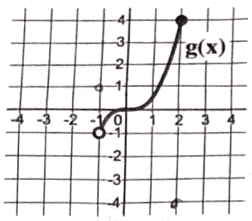
(ii). The next step would be 2 to the right. $3f(x)-2$

(b). (2 points) Suppose $A(x)$ is $f(x)$ first shifted to the right by 2, then flipped across the y-axis. Suppose $B(x)$ is $f(x)$ first flipped across the y-axis, then shifted to the right by 2. Does $A(x) = B(x)$? Equivalently, does the order of these transformations matter? **Justify.**

$A(x) = (x-2)$

TRANSFORMATIONS OF FUNCTIONS: Invert, Shift, Stretch, & Flip!

The function $g(x)$ is depicted below. Given the verbal description:
(i). graph the given transformation of g,
(ii). write an algebraic expression for the given transformation of g,
(iii). generalize the algebraic expression using k.

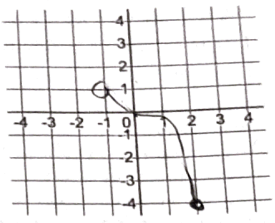


Domain of $g(x)$: $(-1, 2]$

Range of $g(x)$: $(-1, 4]$

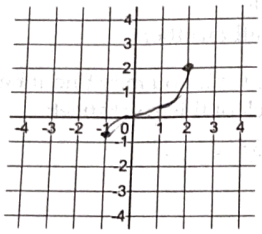
Domain of $g^{-1}(x)$: $(-1, 2]$

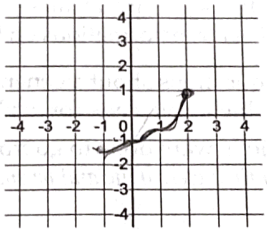
Range of $g^{-1}(x)$: $[-4, 1)$

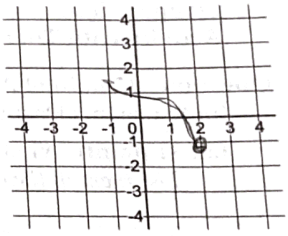


(a). Questions on g and g^{-1} *(each 2 points)*. (i). Fill-in domain-range above. (ii). Graph $g^{-1}(x)$.

(b). **VERTICAL transformations of $g(x)$ below** *(SHIFT/FLIP each 2 points)*





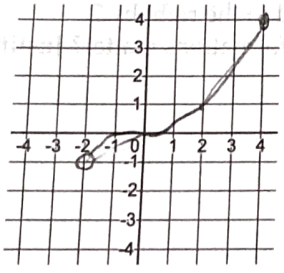


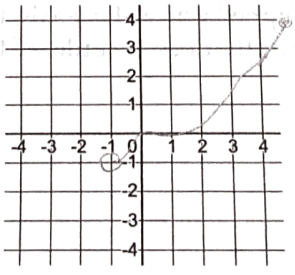
⋆(i). STRETCH (output) by $\frac{1}{2}$ *(or k)*. (i). SHIFT (output) down by 1 *(or k)*. (i). FLIP (output).

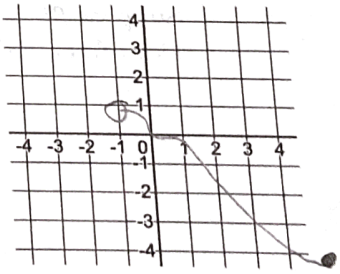
⋆(ii). $T(x) = \frac{1}{2}\, g(x)$ (ii). $A(x) = \frac{1}{2} g(x) + 1$ (ii). $A(x) = k \cdot g(x) - b$

⋆(iii). $V(x) = k \cdot g(x)$ (iii). $A(x) = k \cdot g(x) + b$

(iii). **HORIZONTAL transformations of $g(x)$ below** *(SHIFT/FLIP each 2 points)*







⋆(i). STRETCH (input) by 2 *(or k)*. (i). SHIFT (input) right by 1 *(or k)*. (i). FLIP (input).

⋆(ii). $S(x) = g\left(\frac{1}{2}x\right)$ (ii). $B(x) = g\left(\frac{1}{2}x\right) - 1$ (ii). $C(x) = g(kx) + 2$

⋆(iii). $Q(x) = g(kx)$ (iii). $Z(x) = g(kx) - 2$