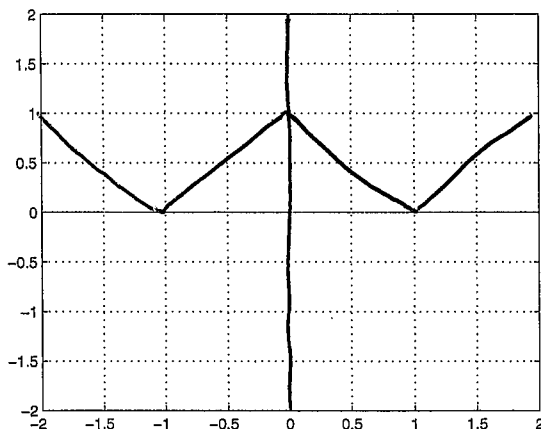


Lab Time:

Your Name:

BUCKMIRE

GOAL: This quiz is designed to illuminate your understanding of functions, both visually and conceptually as well as transformations of functions due to linear compositions.



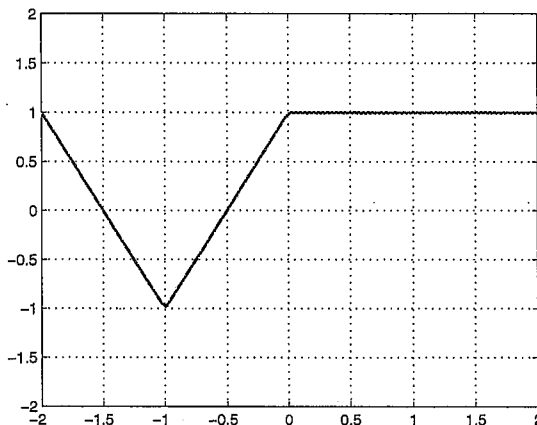
1. (10 points TOTAL.) On the axes above, please sketch the graph of the following function

$$h(s) = \begin{cases} |s+1|, & \text{if } -2 \leq s < 0 \\ |s-1|, & \text{if } 0 \leq s \leq 2 \end{cases}$$

Is  $h(s)$  an even function, an odd function or neither? EXPLAIN YOUR ANSWER USING AT LEAST TWO COMPLETE SENTENCES.

$h(s)$  is an even function. Since  $h(-s) = h(s)$  and since it is ~~defined~~ symmetric about the vertical axis,  $h(s)$  is an even function.

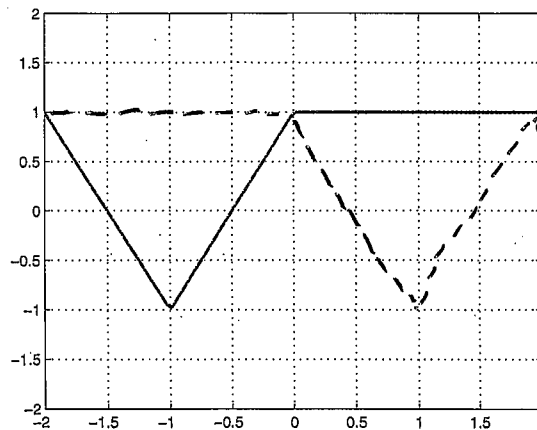
2. (10 points TOTAL). Consider the graph of the following unknown function  $f(x)$  which you are told is defined for all real numbers, i.e. a domain of  $(-\infty, \infty)$ .



2 (a) (3 points.) In the space below, please write down a piecewise-defined function  $f(x)$  for which the graph above is a visual representation.

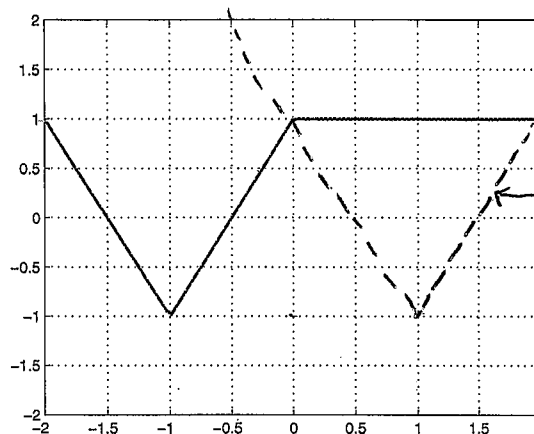
$$f(x) = \begin{cases} 1, & x \geq 0 \\ 2|x+1|-1, & x < 0 \end{cases} \quad \text{OR} \quad f(x) = \begin{cases} 1, & x \geq 0 \\ 2x+1, & -1 < x < 0 \\ -2x-3, & x \leq -1 \end{cases}$$

2 (b) (2 points.) On the figure below, carefully draw in the graph of the function  $f(-x)$ . CLEARLY INDICATE ON THE FIGURE WHICH GRAPH IS  $f(-x)$ .



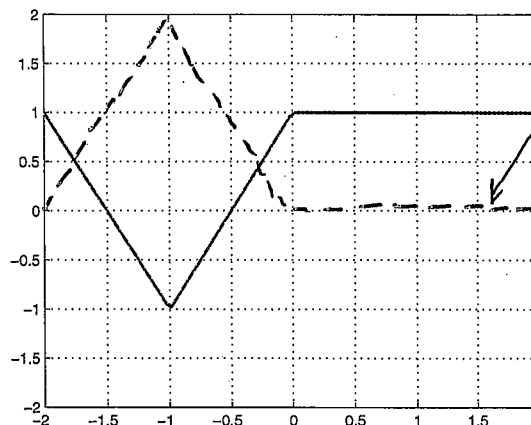
$f(-x)$  is  $f(x)$   
REFLECTED  
ABOUT  
Y-AXIS

2 (c) (2 points.) On the figure below, carefully draw in the graph of the function  $f(x-2)$ . CLEARLY INDICATE ON THE FIGURE WHICH GRAPH IS  $f(x-2)$ .



$f(x-2)$  is  $f(x)$   
SHIFTED  
2 UNITS  
RIGHT

2 (d) (3 points.) On the figure below, carefully draw in the graph of the function  $-f(x)+1$ . CLEARLY INDICATE ON THE FIGURE WHICH GRAPH IS  $-f(x)+1$ .



$1-f(x)$  is  $f(x)$   
REFLECTED ABOUT  
X-AXIS THEN  
SHIFTED UP 1 UNIT

BONUS ((5 points.) For parts (a), (b) and (c) explain what kind of transformation the graph of  $f(x)$  is undergoing (i.e. reflection, shift or stretch) AND write the new function (the one you sketched) as a COMPOSITION of two functions,  $f(x)$  and an unknown function  $g(x)$  in each case.

(b)  $g(x) = -x$       $f(-x) = f(g(x)) = (f \circ g)(x)$

(c)  $g(x) = x-2$       $f(x-2) = f(g(x)) = (f \circ g)(x)$

(d)  $g(x) = 1-x$       $1-f(x) = g(f(x)) = (g \circ f)(x)$