Group #: _____ Name: _____

1. (10 points) Construct a graph of a relation that is not a function.

2. (20 points) To discourage excessive water use, a city charges its residents at a rate of \$0.008 per gallon for the first 4000 gallons used in a given month, while it charges a rate of \$0.012 per gallon for all water usage in excess of 4000 gallons during that month.

   (a) Find a piecewise function modeling the cost $C(x)$ to a household using x gallons of water in a month.

   (b) Complete the sentence: The cost to a household using 4010 gallons during a month is _____ (Be sure to include units here).

   (c) Complete the sentence: The cost to a household using 2000 gallons during a month is _____ (Be sure to include units here).

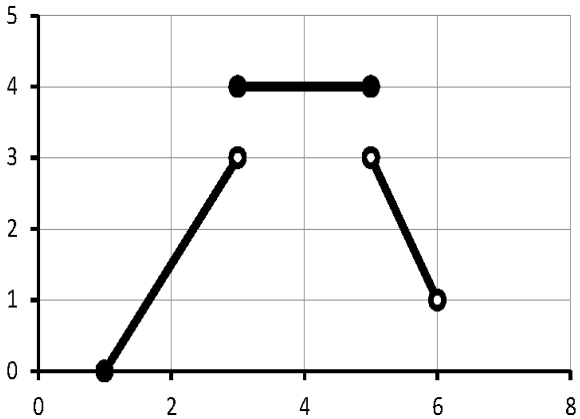
3. (30 points) Graph the following functions. Be sure to label your grid, axes, and tick marks carefully. (Scale is very important in graphical representations. A graph without clear indication of units or increment size is useless. Imagine the reaction you get when your friend tells you that they got a really good deal with this sentence: "Hey man, I just bought 5 cups of coffee from Starbucks for 50." Was it 50 dollars total? Or 50 cents each? Or something totally out of whack?) We need to get into a good habit of labeling and providing detailed information in our stories to make sure the facts we present are as precise as possible.

   (a) $f(x) = \begin{cases} 2x+3 & \text{if } x < -1 \\ 3-x & \text{if } x \geq -1 \end{cases}$

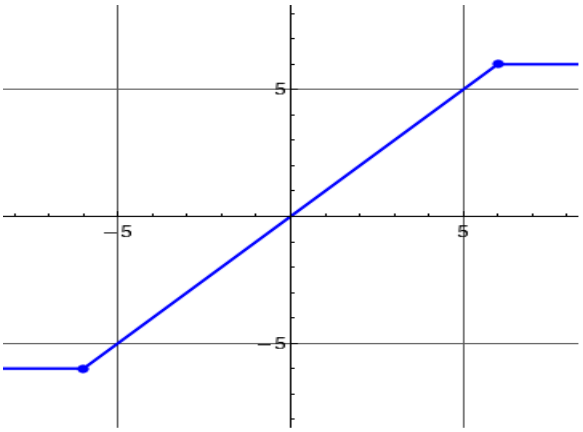
   (b) $g(x) = \dfrac{1}{x^3}$

   (c) $h(x) = 1 + |x-2|$

4. (40 points) Write a formula for the piecewise functions whose graphs are given here.



(a)



(b)