Name: <u>C. Walker</u>

Quiz 4 Solutions
MAC 1147.6861, Fall 2016
Thursday, September 29, 2016

Show all relevant work to support your answer. A correct answer without supporting work will not earn the points. **Problems 3 and 4 are on the back.**

1. (1 point) What is your favorite joke? (Hint: There is no wrong answer)

1. ⎯⎯⎯⎯⎯⎯⎯

2. (4 points) Given the function $f(x) = x^4 - 9x^2$, determine the following:

   (a) the zeros of $f(x)$.

   > **Solution:** The zeros of $f(x)$ occur when $x^4 - 9x^2 = 0$. Simplifying, we get $x^2(x-3)(x+3) = 0$, so that the zeros occur at $x = -3, 0, 3$.

   (b) the right and left hand behaviors of $f(x)$.

   > **Solution:** Using the leading coefficient test, we see the polynomial can be compared to an even function with positive coefficient (i.e $f(x) = x^2$). Hence, $f(x)$ increases as you go to the left and right.

3. (2 points) Use the graph of $f(x) = |x|$ to write an equation for the function shown below.
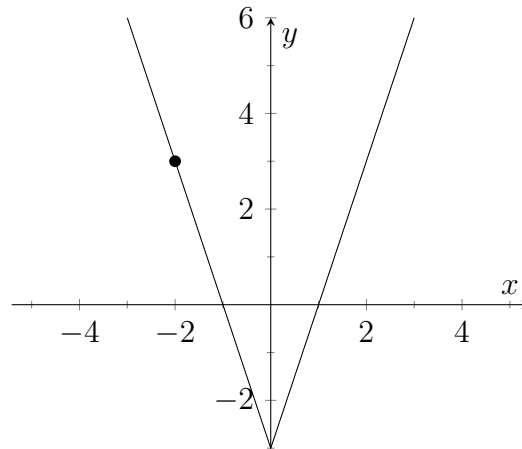
Solution: We know the general equation for the function is $f(x) = a \, |x - b| + c$, where a, b, and c are rational numbers. Observe first that there is no horizontal shift (i.e $b = 0$), and a vertical shift of 3 units down (i.e $d = -3$). In order to find a, we plug in the point $(-2, 3)$ into the simplified equation $y = a \, |x| - 3$. Therefore after solving, we see $a = 3$. Then the equation of the function is $f(x) = 3 \, |x| - 3$.

4. (3 points) Find the inverse function of $f(x) = \dfrac{5x - 3}{2x + 5}$.

Solution: We can solve for the inverse function with the following steps:

$$y = \frac{5x - 3}{2x + 5}$$
$$x = \frac{5y - 3}{2y + 5}$$
$$x(2y + 5) = 5y - 3$$
$$2xy + 5x = 5y - 3$$
$$2xy - 5y = -5x - 3$$
$$y(2x - 5) = -5x - 3$$
$$y = \frac{-5x - 3}{2x - 5}$$

Hence $f^{-1}(x) = \dfrac{-5x - 3}{2x - 5}$.