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Quiz 4 Solutions
MAC 1147.3881, 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 $f(x) = x^3 - 25x$, determine the following:

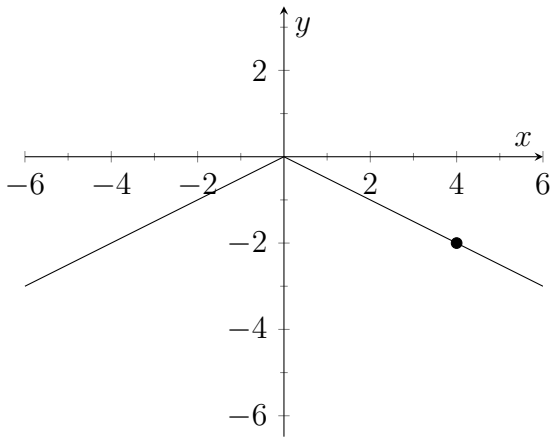
   (a) the zeros of $f(x)$.

   Solution: The zeros of $f(x)$ occur when $x^3 - 25x = 0$. Simplifying, we get $x(x-5)(x+5) = 0$, so that the zeros occur at $x = -5, 0, 5$.

   (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 odd function with positive coefficient (i.e $f(x) = x^3$). Hence, $f(x)$ decreases as you go to the left and increases as you go to the 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 no vertical shift (i.e $c = 0$). Also there is a reflection around the x-axis, so that a is negative. In order to find a, we plug in the point $(4, -2)$ into the simplified equation $y =$a $|x|$. Therefore after solving, we see $a = -\frac{1}{2}$. Then the equation of the function is $f(x) = -\frac{1}{2}\ |x|$.

4. (3 points) Find the inverse function of $f(x) = \dfrac{6x + 4}{4x + 5}$.

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

$$\begin{aligned} y &= \frac{6x + 4}{4x + 5} \\ x &= \frac{6y + 4}{4y + 5} \\ x(4y + 5) &= 6y + 4 \\ 4xy + 5x &= 6y + 4 \\ 4xy - 6y &= -5x + 4 \\ y(4x - 6) &= -5x + 4 \\ y &= \frac{-5x + 4}{4x - 6} \end{aligned}$$

Hence $f^{-1}(x) = \dfrac{-5x + 4}{4x - 6}$.