Math 1: Calculus with Algebra
Fall 2015

Quiz 2

Name: Answer Key

Instructions: (24 points) This quiz consists of 5 problems covering material through the 2nd week of class. Credit is awarded for correct solutions in which you show your work. You will have 30 minutes to complete this quiz. You may not use a calculator, textbook, notes, or any outside source while taking this quiz.

(4^{pts}) **1.** *True* or *False*. If it is true, explain why. If it is false, explain why or given an example that disproves the statement.

(a) **F** If f is a function then $f(3x) = 3f(x)$.

Solution: The function $f(x) = x^2$ is a counterexample, since $f(2) = 4 \neq f(3 \cdot 2) = 36$.

(b) **T** The average rate of change between a and b on a function f is the slope of the secant line between $(a, f(a))$ and $(b, f(b))$.

Solution: This the geometric definition we gave in class.

(c) **F** For any functions f and g, $f \circ g = g \circ f$.

Solution: The functions $f(x) = x^2$ and $g(x) = x + 1$ are counterexamples, since $f \circ g = x^2 + 2x + 1 \neq = g \circ f = x^2 + 1$

(d) **T** The graph of $-f(x)$ reflects the function $f(x)$ across the x-axis.

Solution: This the geometric definition we gave in class.

(5^{pts}) **2.** Consider the following two functions:

$$f(x) = x^2 - 3x + 1 \qquad g(x) = \sqrt{x} + 1$$

(a) (2 pts) Compute the average rate of change of f on the interval $[-1, 4]$.

Solution: Compute $\dfrac{f(4) - f(-1)}{4 - (-1)} = \dfrac{5 - 5}{5} = 0$

(b) (3 pts) Compute the average rate of change of $(f + g)$ on the interval $[0, 1]$.

Solution: Compute $\dfrac{(f + g)(1) - (f + g)(0)}{1 - 0} = \dfrac{(-1 + 2) - (1 + 1)}{1 - 0} = \dfrac{1 - 2}{1} = -1$

(5^{pts}) **3.** For each of the following functions f, write two functions, g and h so that $f = g \circ h$.

(a) (2 pts) $f(x) = \sqrt{x^2 + 4}$

$g(x) =$

$h(x) =$

Solution: One possibility is $g(x) = \sqrt{x}$ and $h(x) = x^2 + 4$.

(b) (3 pts) $f(x) = \dfrac{1 + x^2}{x^2 - 4}$

$g(x) =$

$h(x) =$

Solution: One possibility is $g(x) = \dfrac{1 + x}{x - 4}$ and $h(x) = x^2$.

(5^{pts}) **4.** For each of the transformations described write an algebraic expression that would perform the transformation on the graph of the function.

(a) (2 pts) Shift the graph of $y = f(x)$ two units up and three units to the right.

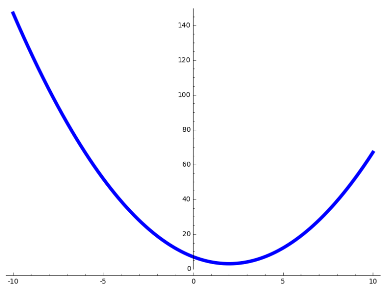
Solution: The transformation $f(x - 3) + 2$.

(b) (3 pts) Shift the graph of $y = h(x)$ down 1 unit and then reflect across both the x and y axes.

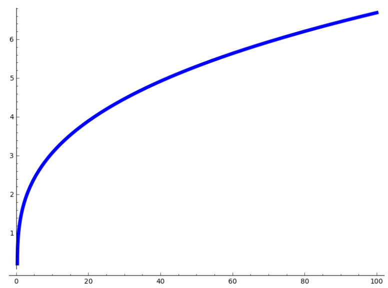
Solution: The transformation $-(h(-x) - 1)$.

(5pts) **5.** Match each of the following graphs with the function family that it belongs to.

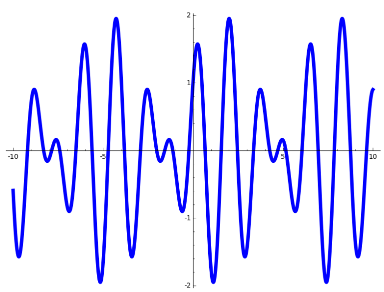
(A) Polynomial (even degree)
(B) Polynomial (odd degree)
(C) Reciprocal
(D) Root
(E) Trigonometric



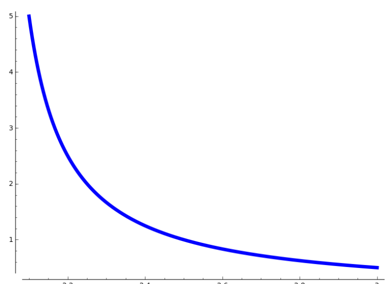
(a) A



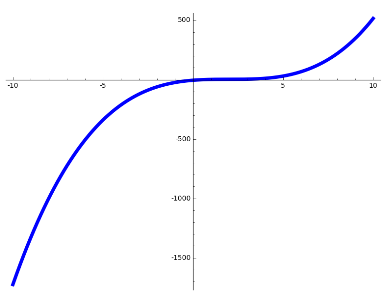
(b) D



(c) E



(d) C



(e) B