Quiz 4

MATH 115, Fall 2017

Tuesday Lecture Time: (circle one) 12-12:50 pm, 1-1:50 pm

Directions: Read each problem carefully and show your work. There are two problems on the reverse side. No calculators are allowed.

1. (3 points)
   Parts (a) and (b) below refer to the function \( f(x) = \sqrt{2x - 1} \).

   (a) Determine \( f(1 + h) \) and simplify your answer as much as possible.

   \[
   f(1 + h) = \sqrt{2(1+h) - 1} = \sqrt{2 + 2h - 1} = \sqrt{1 + 2h}
   \]

   \[
   f(1 + h) = \sqrt{1 + 2h}
   \]

   (b) Determine the **domain** of this function and write your answer using *interval notation*.

   \[
   2x - 1 > 0 \Rightarrow 2x > 1 \Rightarrow x > \frac{1}{2}
   \]

   **domain:** \([ \frac{1}{2}, \infty )\)

2. (2 points)

   Determine the **average rate of change** of the function \( f(x) = x^3 + 2 \) on the interval \([-1, 1]\).

   \[
   \frac{f(1) - f(-1)}{1 - (-1)} = \frac{(1)^3 + 2 - ((-1)^3 + 2)}{2} = \frac{2}{2} = 1
   \]

   **average rate of change:** 1
3. (3 points)

Parts (a) and (b) below refer to the function given by

\[ g(x) = \begin{cases} 
    x + 1 & \text{if } x < 0 \\
    x^2 & \text{if } x > 0.
\end{cases} \]

(a) Draw the graph of this function. Use a filled-in dot for a point on the graph, and a non-filled-in dot for a point not on the graph.

(b) What is the domain of this function?

All real numbers except 0, i.e., \((-\infty, 0) \cup (0, \infty)\).

4. (2 points)

State if the function \( h(x) = 3x^2 - 1 \) is even, odd, or neither; then briefly explain your answer.

This function is even.

\[ h(-x) = 3(-x)^2 - 1 = 3x^2 - 1 = h(x) \]

or

y-axis symmetry shows even.