MAT 1340   Week 6 Written Assignment
  points   Covers Sections 2.4 – 2.6

2.4 – Average Rate of Change of a Function.
2.5 – Linear Functions and Models
2.6 – Transformations of Functions

Be sure to follow [College Algebra formatting guidelines](#) in your work. We will be doing a lot more with graphing techniques in future weeks.

1. Let $s(x) = x^2 - 5x$

    a. (5 pts) Find the *net change* in s from $x = 1$ to $x = 5$.

    b. (5 pts) Find the *average rate of change* in s from $x = 1$ to $x = 5$.

    c. (5 pts) Simplify the difference quotient for s: $\dfrac{s(a+h)-s(a)}{h}$.

2. (5 pts) Let $f(x) = \dfrac{1}{x-3}$. Find an expression for the difference quotient $\dfrac{f(a+h)-f(a)}{h}$. Simplify your answer.

Year	Population
2002	3,220
2004	3,645
2006	4,357
2008	4,869
2010	5,871
2012	6,375
2014	6,288
2016	5,318
2018	4,921
2020	4,636

3. (5 pts) The table on the right gives the population P in a small coastal communty for the period 2002 – 2020. Figures shown are for January 1st of each year. What was the average rate of change of population betwen 2010 and 2014?

4. (5 pts) Find the average rate of change for $f(x) = 2\sqrt{x}$ between

    $x = a$ and $x = a + h$. In other words, find the difference quotient $\dfrac{f(a+h)-f(a)}{h}$.

    Simplify your answer.

5. A large koi pond is filled from a garden hose at the rate of 10 gl/min. Initially, the pond contains 500 gal of water.

    a. (5 pts) Find a linear function V that models the volume of the water (in gallons) in the pond at any time t given in minutes.

    b. (5 pts) If the pond has a capacity of 2,000 gallongs, how long (in minutes) does it take to completely fill the pond?

    c. (5 pts) Assume you stop when the pond is full. What's the domain of the function V? What's the range of the function V?

I'd love for you to take a bite out of #6 on Page 2. It's all bonus if you can wrap your head around the entire thing by the time Week 6 is due. I will be opening up an extra Assignment on the concepts in #6 that will be due after Spring Break (March 24th due date). A whole extra Assignment, for those looking to improve their Weekly Written Category.

The extra will be similar to Writing Project #2 from Fall/Spring 2016 (See links, below.), but it will be shorter and this #6 will be on it.

I don't care if you use Method 1 or Method 2. I think I switched the labels on them sometime between 2016 and 2020. The method I like isn't the easiest for some students. I like the now-Method 2, because of the way you want to think about wavelength and phase in trigonometry and calculus. But Method 1 is legit, and there are fewer fractions involved.

6. (10 pts Bonus) Transform the graph of $f(x) = \sqrt{x}$ to the graph of $g(x) = -4\sqrt{-5x - 20} + 64$, by the methods of my old Writing Project #2:

   a. Library of Basic Functions
      i. Notes (See Page 6 for Square-Root Function)
      ii. Square-Root Function Video (and all even-indexed roots).
   b. Stretching, Shrinking, Reflecting, and Shifting Basic Functions
      i. Notes on Basic Moves
      ii. Video on Basic Moves
      iii. Notes on Combining the Moves
      iv. Videos on Combining the Moves
         1. Method 1 – Preferred by Algebra Students
         2. Method 2 – Preferred by Trigonometry and Calculus Students
   c. There are numerous examples of Square-Root Functions in Spring, 2016 Writing Project #2. I notice that 8 years ago, the Method 1 and Method 2 were reversed.

      The difference between the two methods is that the Method 1 in the videos above is the student-preferred method, which does the horizontal shift before the horizontal stretch/shrink/reflect. Less fractions.

      Method 2 in the above is the teacher-preferred method, which does the horizontal stretch/shrink/reflect, first, and then it does the horizontal shift.
         i. Spring, 2016 Writing Project #2 (Check out all the square root examples!)
         ii. Spring, 2016 Writing Project #2 Solutions

7. (5 pts Bonus) Find the *exact x*- and *y*-intercepts of $g(x)$ from #6.

#6 and #7 will re-appear on the Extra Written Assignment.