# MATH 1710.200 - Homework 3

Due: 9/21/16

1. Suppose $f(x) = \begin{cases} \cos(\pi x/2) & \text{if } |x| < 1 \\ |x-1| & \text{if } |x| \geq 1 \end{cases}$.

   Determine any points where $f$ is discontinuous and classify the type of discontinuity (removable, jump, or infinite). Also, determine if $f$ is left or right continuous at these points.

2. Use the intermediate value theorem to prove that the equation $2^x + 1/x = -4$ has at least one real solution.

3. Textbook 2.6 # 13, 39, 41, 42, 57, 58, 63, 76

4. Textbook 2.7 # 10, 42

5. Let $f(x) = 1/\sqrt{x}$.

   (a) Using only the definition of the derivative, compute $f'(x)$ for $x > 0$.

   (b) Write the equation of the tangent line to $f(x)$ at $x = 16$.

6. Let $f(x) = \dfrac{x}{x+1}$.

   (a) Using only the definition of the derivative, compute $f'(x)$.

   (b) Are there any points on the graph of $f$ for which the tangent line is horizontal? If not, explain why not (*Hint*: what is the slope of a horizontal line?).

7. Textbook 2.8 # 4, 10, 16, 28, 41, 47, 55