Test 1 - MATH 471

Name: _____

Directions: Show ALL work on the test paper. Please note that correct answers without supporting work will not receive full credit. To receive full credit for solutions, all problems should be completed using only the methods and techniques discussed in this class so far this semester. **Note: Your final answer to each question should be clearly labeled and/or circled.** You may not receive human help on this assessment. Any Python code you use in your solutions must be written by you, and you alone. Your Zoom camera should remain on throughout this assessment.

1. (50 pts.) Determine the Taylor polynomial of degree 3 for $f(x) = \log_{10}(x)$ centered at $x_0 = 3/4$. In this, assume $\log_{10}(3/4) \approx -0.12493873$ and $\ln(10) \approx 2.30258509$. What is the error in this Taylor polynomial for $x \in [1/2, 1]$?

2. (50 pts.) For each value x below, compute the approximation for $f(x)$ using the degree 3 Taylor polynomial from Problem 1. Hint: the numbers below fall outside of the range $[1/2, 1]$, so the numbers must be converted to an appropriate format to achieve accurate results.

   (a) $x = 25$

   (b) $x = 141$

   (c) $x = 2/5$

   (d) $x = 1/1000000$