Honors Calculus Quiz 8 11/18/5

Name: 
Signature: 

Show your work.

Question 1

Determine the following integrals:

\[ \int_{0}^{\frac{\pi}{3}} (\sin^{99}(t) \cos(t) + 2 \tan(t)) \, dx \]

\[ \int_{0}^{1} \left( \frac{t^2 + t + 3}{(t + 1)^2(t - 2)} \right) \, dt \]

Question 2

Use an appropriate quadratic Taylor expansion to estimate \((8.03)^{\frac{1}{3}}\) and estimate the error in your approximation.

Question 3

Let \( J = \int_{1}^{5} \frac{1}{x^2} \, dx \).

- Estimate the integral \( J \) using the midpoint and trapezoidal rules for four intervals and using Simpson’s rule with eight intervals and for each determine the maximum possible error.

- Estimate the number of intervals needed to approximate the integral \( J \) to an accuracy of \(10^{-5}\), using:
  - the midpoint rule
  - Simpson’s rule