MATH 178

Sec. 7.5 — Extra Problems

1. Approximate \( \int_0^3 \frac{3}{x^2 + 4} \, dx \) using \( n = 4 \) and
   (Round off answers to 4 decimal places.)
   a) The Midpoint Rule,
   b) The Trapezoidal Rule,
   c) Simpson's Rule.

2. Approximate \( \int_0^4 \frac{10}{\sqrt{x^3 + 1}} \, dx \) using \( n = 4 \) and
   (Round off answers to 4 decimal places.)
   a) The Midpoint Rule,
   b) The Trapezoidal Rule,
   c) Simpson's Rule.

3. The speed of a car in ft/sec after \( t \) sec is given by the following table:

   \[
   \begin{array}{c|ccccccc}
   t \text{ (sec)} & 0 & 5 & 10 & 15 & 20 & 25 & 30 \\
   \hline
   v \text{ (ft/sec)} & 0 & 42 & 60 & 72 & 83 & 90 & \\
   \end{array}
   \]

   Approximate the total distance traveled by the car in the first 30 seconds using
   a) The Trapezoidal Rule,
   (Round off answers to the nearest foot.)
   b) Simpson's Rule.

4. A lot is bounded by two perpendicular roads and a stream. Using the lengths (measured in ft) given below, estimate the area of the lot using
   a) The Trapezoidal Rule,
   (Round off answers to the nearest integer.)
   b) Simpson's Rule.

   \[
   \begin{array}{c|cccccc}
   x \text{ (ft)} & 0 & 10 & 20 & 30 & 40 & 50 & 60 \\
   \hline
   y \text{ (ft)} & 54 & 60 & 64 & 69 & 62 & 48 & 25 \\
   \end{array}
   \]

5. Find the smallest value of \( n \) required to guarantee that the error in approximating \( \int_0^3 \frac{1}{x + 4} \, dx \) is at most \( 10^{-5} \) using
   a) The Trapezoidal Rule,
   b) The Midpoint Rule,
   c) Simpson's Rule.