Section 6.4 Supplement - Trapezoid and Simpson’s Rules

1. Use Trapezoid Rule to approximate \( \int_{2.05}^{2.30} f(x) \, dx \) using the table below.

\[
\begin{array}{cccccc}
  x & 2.05 & 2.10 & 2.15 & 2.20 & 2.25 & 2.30 \\
  f(x) & -3 & -1.5 & 1 & 2 & 2.5 & 3 \\
\end{array}
\]

2. A piece of lakefront property is 250 feet wide and has 3 straight sides and an irregular shoreline. The distance from the property line road to the shoreline is measured every 50 feet as illustrated in the following diagram where \( x \) is the distance along the property line road (the positive \( x \)-axis from \( x = 0 \) to \( x = 250 \)) and \( f(x) \) is the measured distance from the property line road to the shoreline. Use the Trapezoid rule to determine the approximate acreage of the property. (1 acre = 43,560 sq. ft.)

3. Given \( \int_{-2}^{10} (x^2 + 1) \, dx \) with \( n = 6 \) subintervals,
   a. Use the Trapezoid rule to approximate the value of the integral.
   b. Use Simpson’s rule to approximate the value of the integral.
   c. Use Simpson’s rule to approximate the area bounded by the function \( y = x^2 + 1 \), the \( x \)-axis, and the lines \( x = -2 \) and \( x = 10 \).

4. Use Simpson’s rule and the data given for marginal revenue in the following table to approximate the revenue of the first 100 units sold for the given product. Assume \( q \) is the number of units and \( MR \) is in dollars/unit.

\[
\begin{array}{cccccc}
  q & 0 & 25 & 50 & 75 & 100 \\
  MR & 200 & 180 & 120 & 93 & 91 \\
\end{array}
\]