Q1: Approximate the area of the region bounded by the curve \( y = \frac{x^2}{2} + 1 \) and the x-axis for \( 0 \leq x \leq 6 \) using 3 rectangles.

1. Sketch the rectangles associated with \( R_3 \)

2. Find \( R_3 \).

\[
R_3 = f(2) \cdot 2 + f(4) \cdot 2 + f(6) \cdot 2
\]
\[
= 3 \cdot 2 + 9 \cdot 2 + 19 \cdot 2
\]
\[
= 6 + 18 + 38
\]
\[
= 62
\]

3. Find \( L_3 \).

\[
L_3 = f(0) \cdot 2 + f(2) \cdot 2 + f(4) \cdot 2
\]
\[
= 1 \cdot 2 + 3 \cdot 2 + 9 \cdot 2
\]
\[
= 2 + 6 + 18
\]
\[
= 26
\]

4. Find \( A_3 \).

\[
A_3 = \frac{R_3 + L_3}{2}
\]
\[
= \frac{62 + 26}{2}
\]
\[
= 44
\]

5. Express this area as a definite integral and use your calculator to evaluate it.

\[
\int_0^6 \left( \frac{x^2}{2} + 1 \right) dx = \frac{1}{2} \cdot \frac{x^3}{3} + x \bigg|_0^6
\]
\[
= \left[ \frac{1}{6} (6^3) + 6 \right] - 0
\]
\[
= 36 + 6
\]
\[
= 42
\]
Q2: Use your calculator to evaluate: set up the calculation and find the total area bounded by

\[ f(x) = x^3 + 2x^2 - 5x - 6 \] and the x-axis for \(-3 \leq x \leq 2\)

\[
\int_{-3}^{1} (x^3 + 2x^2 - 5x - 6) \, dx + (-1) \int_{1}^{2} (x^3 + 2x^2 - 5x - 6) \, dx
\]

Note: In factored form \( f(x) = (x + 3)(x + 1)(x - 2) \)

\[
= 5 \frac{1}{3} + (-1)(-15 \frac{3}{4})
\]

\[
= 5 \frac{4}{12} + 15 \frac{9}{12}
\]

\[
= 21 \frac{1}{12}
\]

\[
= 21.083\overline{3}
\]

Q3: Evaluate the definite integral, show all of your work (i.e. a calculator answer is not sufficient).

\[
\int_{10}^{40} (150 - \frac{x}{10}) \, dx
\]

\[
= 150x - \frac{1}{10} \cdot \frac{x^2}{2}
\]

\[
= 150x - \frac{x^2}{20} \bigg|_{10}^{40} = \left[150(40) - \frac{40^2}{20}\right] - \left[150(10) - \frac{10^2}{20}\right]
\]

\[
= [6000 - 80] - [1500 - 5]
\]

\[
= 4425
\]

B. If the integrand above, \( P'(x) = 150 + \frac{x}{10} \), is the marginal profit (in dollars) for an output of \( x \)
refrigerators per week, What does the value of the definite integral represent?

The total profit from the sale of the 11th through the 40th refrigerators is $4,425.
Q1: Approximate the area of the region bounded by the curve \( y = \frac{x^2}{2} + 1 \) and the x-axis for \( 0 \leq x \leq 6 \) using 3 rectangles.

1. Sketch the rectangles associated with \( R_3 \).
2. Find \( R_3 \).
3. Find \( L_3 \).

4. Find \( A_3 \).

5. Express this area as a definite integral and use your calculator to evaluate it.

(OVER)
Q2: Use your calculator to evaluate: set up the calculation and find the total area bounded by

\[ f(x) = x^3 + 2x^2 - 5x - 6 \] and the \( x \)-axis for \( -3 \leq x \leq 2 \)

Note: In factored form \( f(x) = (x + 3)(x + 1)(x - 2) \)

Q3: Evaluate the definite integral, show all of your work (i.e. a calculator answer is not sufficient).

\[ \int_{10}^{40} \left( 150 - \frac{x}{10} \right) \, dx \]

B. If the integrand above, \( P'(x) = 150 + \frac{x}{10} \), is the marginal profit (in dollars) for an output of \( x \) refrigerators per week. What does the value of the definite integral represent?