1. Express as a definite integral:
\[ \lim_{\Delta \to 0} \sum_{k=1}^{n} (x_k^2 + 1) \Delta x_k \text{ on } [0, 2] \]

2. Suppose \( \int_{1}^{4} f(x) \, dx = 8 \) and \( \int_{1}^{6} f(x) \, dx = 5 \).
Evaluate the following integrals

(a) \( \int_{1}^{4} (-3f(x)) \, dx \)

(b) \( \int_{6}^{1} 2f(x) \, dx \)

3. Consider two functions \( f \) and \( g \) on \([1, 6]\) such that
\[
\int_{1}^{6} f(x) \, dx = 10, \quad \int_{1}^{6} g(x) \, dx = 5,
\int_{1}^{4} f(x) \, dx = 5, \quad \text{and} \quad \int_{1}^{4} g(x) \, dx = 2.
\]
Evaluate the following

(a) \( \int_{1}^{4} (f(x) - g(x)) \, dx \)

(b) \( \int_{6}^{1} (g(x) - f(x)) \, dx \)

(c) \( \int_{1}^{4} 2f(x) \, dx \)

4. Use the definition of a definite integral as a limit of a left Riemann sum to evaluate the definite integrals

(a) \( \int_{1}^{3} (2x + 1) \, dx \)

(b) \( \int_{0}^{2} (x^2 - 1) \, dx \)

5. Remember the floor function \( \lfloor x \rfloor \) is the greatest integer less than or equal to \( x \).
Evaluate the following integral:

\[ \int_{1}^{5} x \lfloor x \rfloor \, dx \]

6. The graphs below represent two functions, \( f(x) \) and \( g(x) \) and the values inside the enclosed portions represent the areas of those portions.

(a) Compute \( \int_{0}^{4} (2f(x) + 3g(x)) \, dx \)

(b) Compute \( \int_{2}^{4} f(x) \, dx \)