Practice Assessment 1

Sums and Geometric Properties of Integrals

These **practice problems** are designed to help you **prepare for our course exams** and **assess your understanding** of the course material at the expected level. Aim to complete them **in class, during tutoring, office hours, or on your own**, and try to solve them **without notes or a calculator**, just like on the **actual exams**. Remember, **practice makes perfect**, so don't hesitate to **ask for help** if you get stuck.

1. A table of values of a function f is given below.

x	0	9	18	27	36
$f(x)$	20	15	-5	-10	5

   (a) Find a left-endpoint approximation with $n = 4$ for $\int_0^{36} f(x)dx$.

   (b) Find a right-endpoint approximation with $n = 4$ for $\int_0^{36} f(x)dx$.

2. Suppose that

$$\int_4^8 f(x)\,dx = 1.7, \qquad \int_6^8 f(x)\,dx = 2.5, \quad \text{and} \quad \int_4^8 \big(f(x)\big)^2\,dx = 5.$$

Evaluate each of the following integrals.

(a) $\displaystyle\int_4^8 (1+f(x))^2\,dx =$ _____.

(b) $\displaystyle\int_4^6 f(x)\,dx =$ _____.

3. Use geometry and properties of integrals to evaluate

$$\int_{-3}^{3} \left(|1 - 2x| + 9 + \sqrt{9 - x^2} \right) dx.$$

4. Let $f(x) = x^2 - 2ax + 1$ where a is a positive constant. Find the value(s) of a such that the average value of f on the interval $[0, a]$ is 0.