

Student: _____
Date: _____

Instructor: Pangyen Weng
Course: Calculus II

Assignment: 1.2 Area and Estimating
 with Finite Sums

1. Use finite approximation to estimate the area under the graph of $f(x) = 3x^2$ and above the graph of $f(x) = 0$ from $x_0 = 0$ to $x_n = 12$ using
- a lower sum with two rectangles of equal width.
 - a lower sum with four rectangles of equal width.
 - an upper sum with two rectangles of equal width.
 - an upper sum with four rectangles of equal width.

The estimated area using a lower sum with two rectangles of equal width is square units.
 (Simplify your answer. Type an integer or a decimal.)

The estimated area using a lower sum with four rectangles of equal width is square units.
 (Simplify your answer. Type an integer or a decimal.)

The estimated area using an upper sum with two rectangles of equal width is square units.
 (Simplify your answer. Type an integer or a decimal.)

The estimated area using an upper sum with four rectangles of equal width is square units.
 (Simplify your answer. Type an integer or a decimal.)

2. Use finite approximations to estimate the area under the graph of the function $f(x) = 8 - x^2 - 2x$ between $x = -4$ and $x = 2$ for each of the following cases.

- Using a lower sum with two rectangles of equal width
- Using a lower sum with four rectangles of equal width
- Using an upper sum with two rectangles of equal width
- Using an upper sum with four rectangles of equal width

a. The area under the graph of $f(x)$ using a lower sum with two rectangles of equal width is . (Type an integer or a decimal.)

b. The area under the graph of $f(x)$ using a lower sum with four rectangles of equal width is . (Type an integer or a decimal.)

c. The area under the graph of $f(x)$ using an upper sum with two rectangles of equal width is . (Type an integer or a decimal.)

d. The area under the graph of $f(x)$ using an upper sum with four rectangles of equal width is . (Type an integer or a decimal.)

3. Using rectangles whose height is given by the value of the function at the midpoint of the rectangle's base, estimate the area under the graph using first two and then four rectangles.

$$f(x) = x^3 \text{ between } x = 2 \text{ and } x = 3$$

Using two rectangles to estimate, the area under $f(x)$ is approximately .
 (Type an integer or a simplified fraction.)

Using four rectangles to estimate, the area under $f(x)$ is approximately .
 (Type an integer or a simplified fraction.)

4. Use the Midpoint Rule to estimate the area under the graph of $f(x) = \frac{2}{x}$ and above the graph of $f(x) = 0$ from $x_0 = 1$ to $x_n = 65$ using two rectangles of equal width and four rectangles of equal width.

The estimated area using the Midpoint Rule with two rectangles of equal width is

square units.

(Round to four decimal places.)

The estimated area using the Midpoint Rule with four rectangles of equal width is

square units.

(Round to four decimal places.)

-
5. The table below shows the velocity of an object (cm/sec) at each sec as it moves along a track of 10 sec.

| | | | | | | | | | | | |
|------------|---|---|---|---|---|---|---|---|---|---|----|
| Time (sec) | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|------------|---|---|---|---|---|---|---|---|---|---|----|

| | | | | | | | | | | | |
|-------------------|---|---|----|----|----|----|----|----|---|---|---|
| Velocity (cm/sec) | 0 | 5 | 11 | 18 | 24 | 36 | 28 | 15 | 8 | 4 | 0 |
|-------------------|---|---|----|----|----|----|----|----|---|---|---|

Estimate the distance traveled using ten subintervals of length 1 sec with left-endpoint values. Estimate the distance traveled using ten subintervals of length 1 sec with right-endpoint values.

The distance traveled using ten subintervals of length 1 sec with left-endpoint values is cm.

(Simplify your answer.)

The distance traveled using ten subintervals of length 1 sec with right-endpoint values is cm.

(Simplify your answer.)

1. 648

1134

3240

2430

2. 0

20.25

54

47.25

3. $\frac{515}{32}$

$\frac{2,075}{128}$

$\frac{2,075}{128}$

4. 5.0708

6.1774

5. 149

149
