

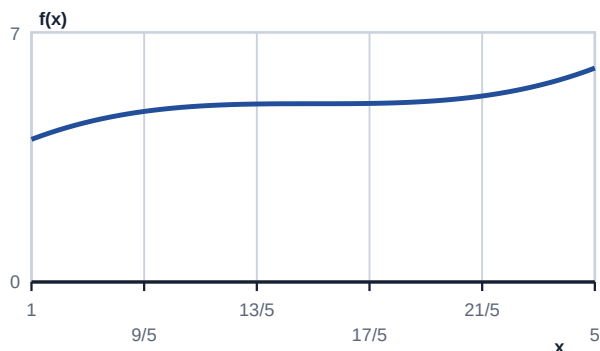
Approximating Area under a Curve

Draw the stated rectangles, then use unrounded function values to calculate the area estimate. Give the final estimate to three decimal places.
Use radians for sine and cosine. Keep full calculator values in the work and round only the final estimate to 0.001.

1. Left endpoint; $n = 5$

$$f(x) = 5 + ((x - 3)/2)^3$$

Interval $[1, 5]$



Draw the rectangles on the graph.

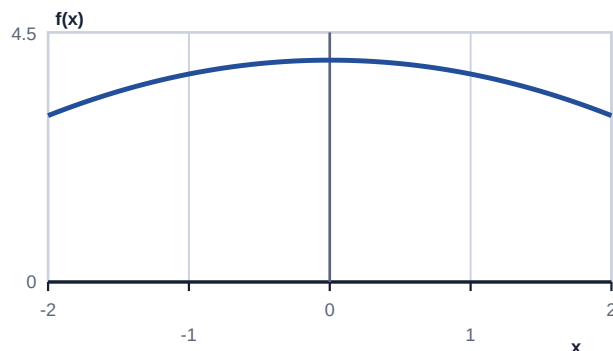
Width: _____

Height sum and area estimate: _____

2. Right endpoint; $n = 4$

$$f(x) = 4 - ((x - 0)/2)^2$$

Interval $[-2, 2]$



Draw the rectangles on the graph.

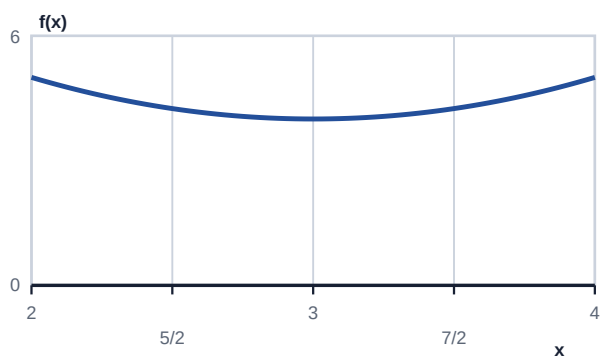
Width: _____

Height sum and area estimate: _____

3. Right endpoint; $n = 4$

$$f(x) = 4 + ((x - 3)/1)^2$$

Interval $[2, 4]$



Draw the rectangles on the graph.

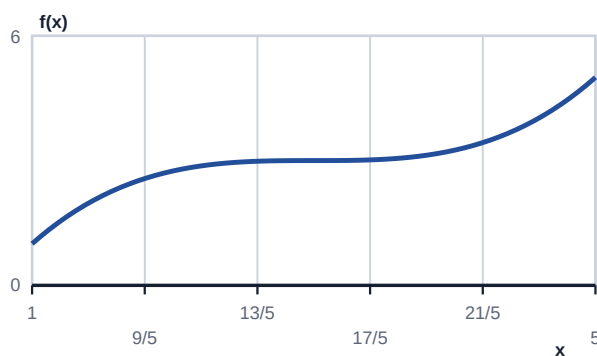
Width: _____

Height sum and area estimate: _____

4. Left endpoint; $n = 5$

$$f(x) = 3 + 2*((x - 3)/2)^3$$

Interval $[1, 5]$



Draw the rectangles on the graph.

Width: _____

Height sum and area estimate: _____

Approximating Area under a Curve

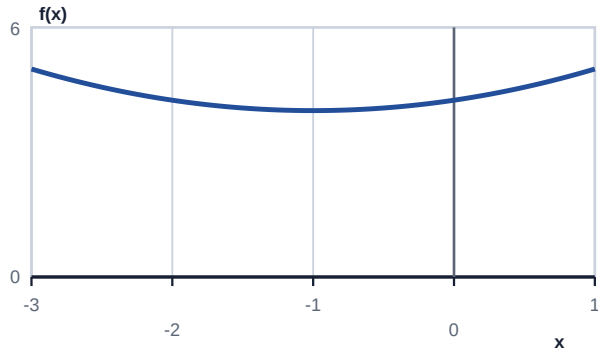
Draw the stated rectangles, then use unrounded function values to calculate the area estimate. Give the final estimate to three decimal places.

Use radians for sine and cosine. Keep full calculator values in the work and round only the final estimate to 0.001.

5. Right endpoint; $n = 4$

$$f(x) = 4 + ((x + 1)/2)^2$$

Interval $[-3, 1]$



Draw the rectangles on the graph.

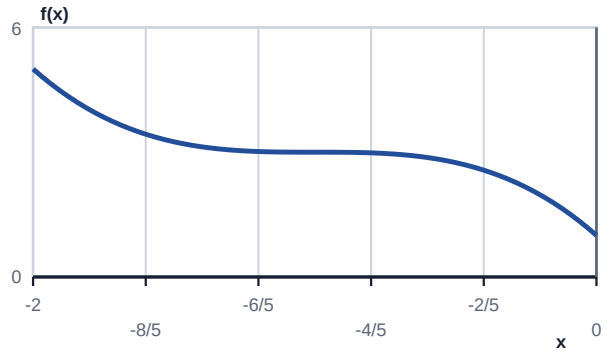
Width: _____

Height sum and area estimate: _____

6. Left endpoint; $n = 5$

$$f(x) = 3 - 2*((x + 1)/1)^3$$

Interval $[-2, 0]$



Draw the rectangles on the graph.

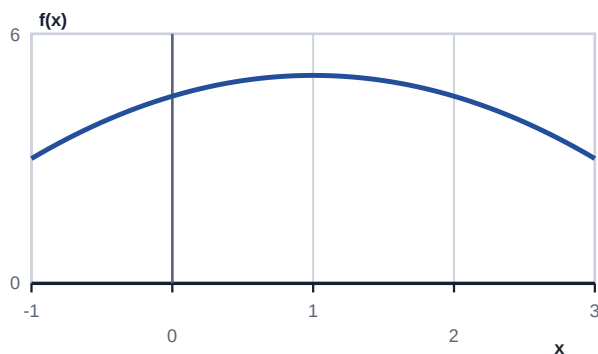
Width: _____

Height sum and area estimate: _____

7. Left endpoint; $n = 4$

$$f(x) = 5 - 2*((x - 1)/2)^2$$

Interval $[-1, 3]$



Draw the rectangles on the graph.

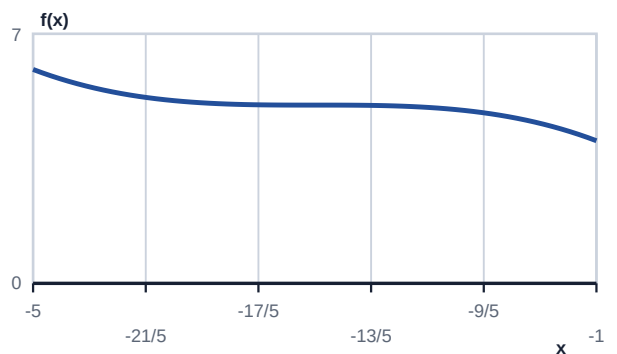
Width: _____

Height sum and area estimate: _____

8. Right endpoint; $n = 5$

$$f(x) = 5 - ((x + 3)/2)^3$$

Interval $[-5, -1]$



Draw the rectangles on the graph.

Width: _____

Height sum and area estimate: _____

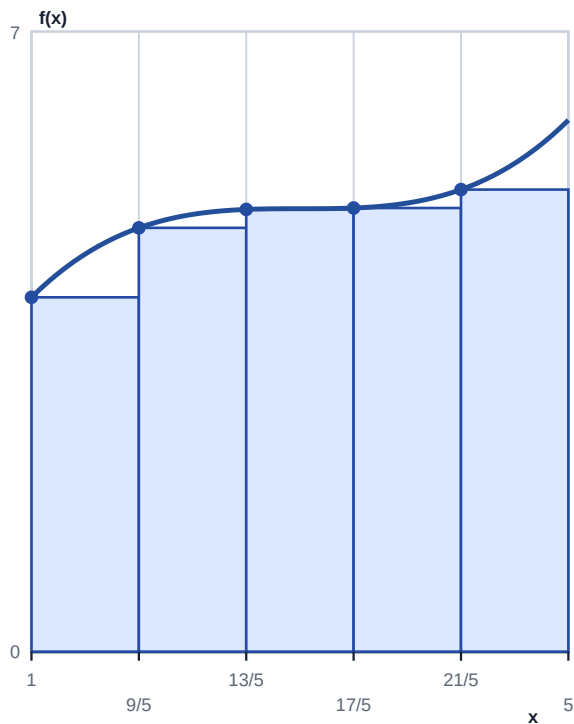
Approximating Area under a Curve

Answer Key

Draw the stated rectangles, then use unrounded function values to calculate the area estimate. Give the final estimate to three decimal places.
Use radians for sine and cosine. Keep full calculator values in the work and round only the final estimate to 0.001.

1. Left endpoint; $n = 5$

$$f(x) = 5 + ((x - 3)/2)^3; \text{ interval } [1, 5]$$



$$\text{Width} = (5 - 1) / 5 = 4/5.$$

$$\text{Selected x-values: } 1, 9/5, 13/5, 17/5, 21/5.$$

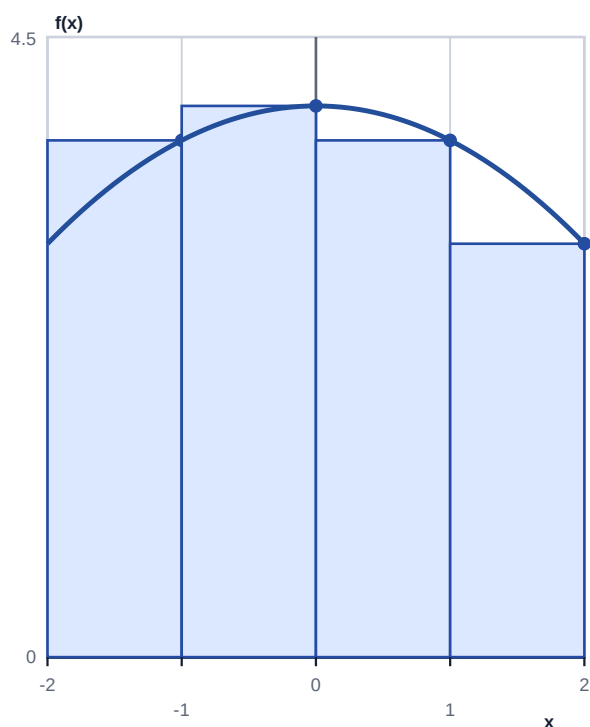
$$\text{Heights: } 4, 598/125, 624/125, 626/125, 652/125.$$

$$\text{Height sum} = 24.$$

$$\text{Area estimate} = 4/5 \times 24 = 96/5 \text{ (about 19.200).}$$

2. Right endpoint; $n = 4$

$$f(x) = 4 - ((x - 0)/2)^2; \text{ interval } [-2, 2]$$



$$\text{Width} = (2 - (-2)) / 4 = 1.$$

$$\text{Selected x-values: } -1, 0, 1, 2.$$

$$\text{Heights: } 15/4, 4, 15/4, 3.$$

$$\text{Height sum} = 29/2.$$

$$\text{Area estimate} = 1 \times 29/2 = 29/2 \text{ (about 14.500).}$$

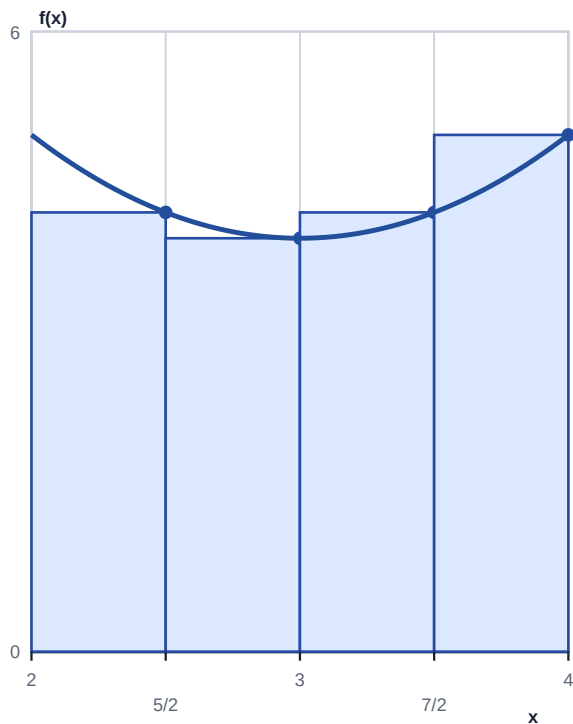
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Answer Key

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Use radians for sine and cosine. Keep full calculator values in the work and round only the final estimate to 0.001.

3. Right endpoint; $n = 4$

$$f(x) = 4 + ((x - 3)/1)^2; \text{ interval } [2, 4]$$



$$\text{Width} = (4 - (2)) / 4 = 1/2.$$

$$\text{Selected x-values: } 5/2, 3, 7/2, 4.$$

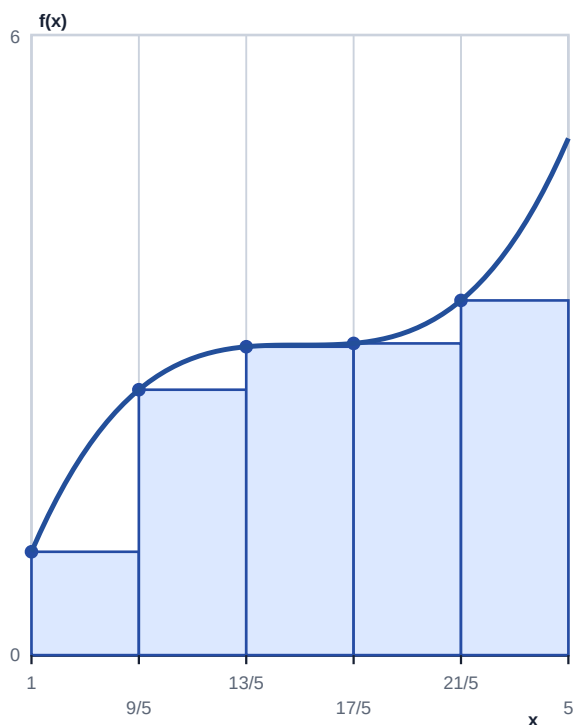
$$\text{Heights: } 17/4, 4, 17/4, 5.$$

$$\text{Height sum} = 35/2.$$

$$\text{Area estimate} = 1/2 \times 35/2 = 35/4 \text{ (about 8.750).}$$

4. Left endpoint; $n = 5$

$$f(x) = 3 + 2*((x - 3)/2)^3; \text{ interval } [1, 5]$$



$$\text{Width} = (5 - (1)) / 5 = 4/5.$$

$$\text{Selected x-values: } 1, 9/5, 13/5, 17/5, 21/5.$$

$$\text{Heights: } 1, 321/125, 373/125, 377/125, 429/125.$$

$$\text{Height sum} = 13.$$

$$\text{Area estimate} = 4/5 \times 13 = 52/5 \text{ (about 10.400).}$$

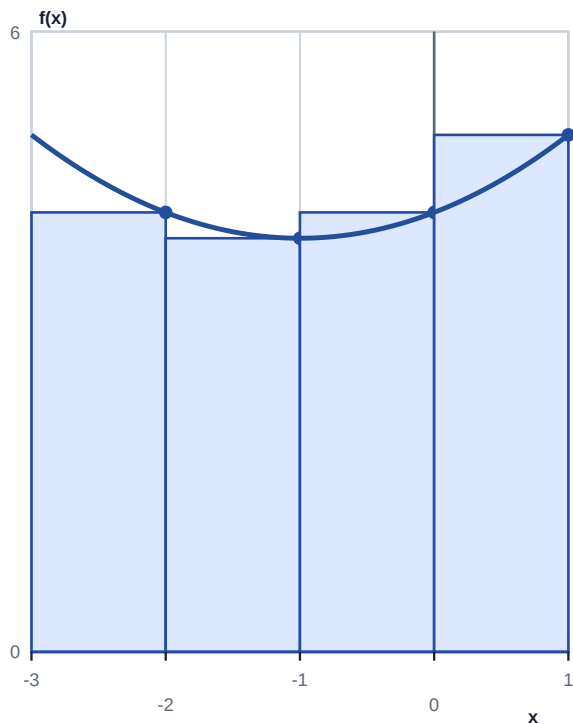
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Answer Key

Draw the stated rectangles, then use unrounded function values to calculate the area estimate. Give the final estimate to three decimal places.
Use radians for sine and cosine. Keep full calculator values in the work and round only the final estimate to 0.001.

5. Right endpoint; $n = 4$

$$f(x) = 4 + ((x + 1)/2)^2; \text{ interval } [-3, 1]$$



$$\text{Width} = (1 - (-3)) / 4 = 1.$$

$$\text{Selected x-values: } -2, -1, 0, 1.$$

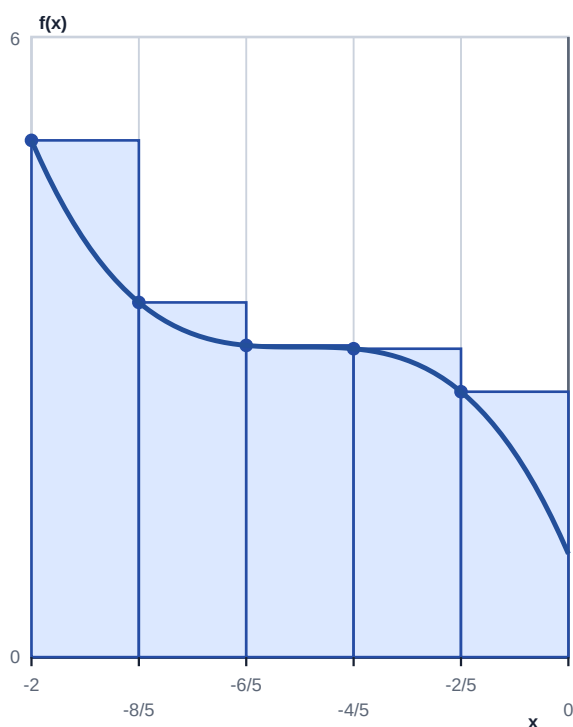
$$\text{Heights: } 17/4, 4, 17/4, 5.$$

$$\text{Height sum} = 35/2.$$

$$\text{Area estimate} = 1 \times 35/2 = 35/2 \text{ (about 17.500).}$$

6. Left endpoint; $n = 5$

$$f(x) = 3 - 2*((x + 1)/1)^3; \text{ interval } [-2, 0]$$



$$\text{Width} = (0 - (-2)) / 5 = 2/5.$$

$$\text{Selected x-values: } -2, -8/5, -6/5, -4/5, -2/5.$$

$$\text{Heights: } 5, 429/125, 377/125, 373/125, 321/125.$$

$$\text{Height sum} = 17.$$

$$\text{Area estimate} = 2/5 \times 17 = 34/5 \text{ (about 6.800).}$$

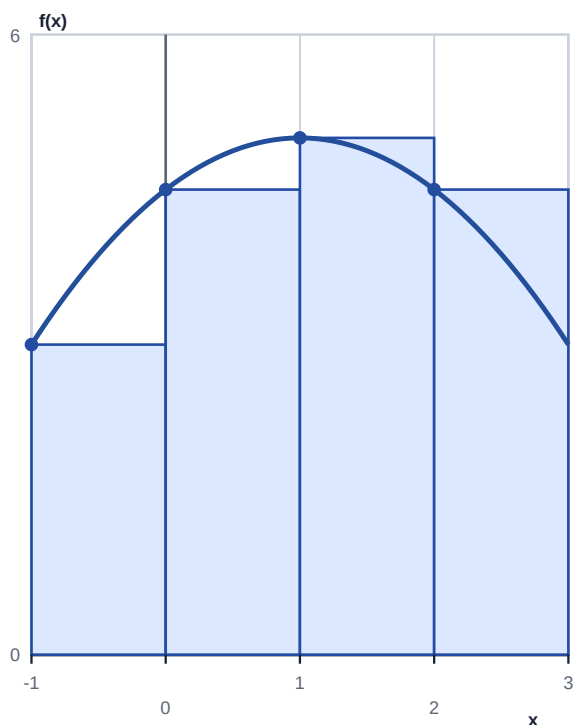
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Answer Key

Draw the stated rectangles, then use unrounded function values to calculate the area estimate. Give the final estimate to three decimal places.
Use radians for sine and cosine. Keep full calculator values in the work and round only the final estimate to 0.001.

7. Left endpoint; $n = 4$

$$f(x) = 5 - 2 \cdot ((x - 1)/2)^2; \text{ interval } [-1, 3]$$



$$\text{Width} = (3 - (-1)) / 4 = 1.$$

$$\text{Selected x-values: } -1, 0, 1, 2.$$

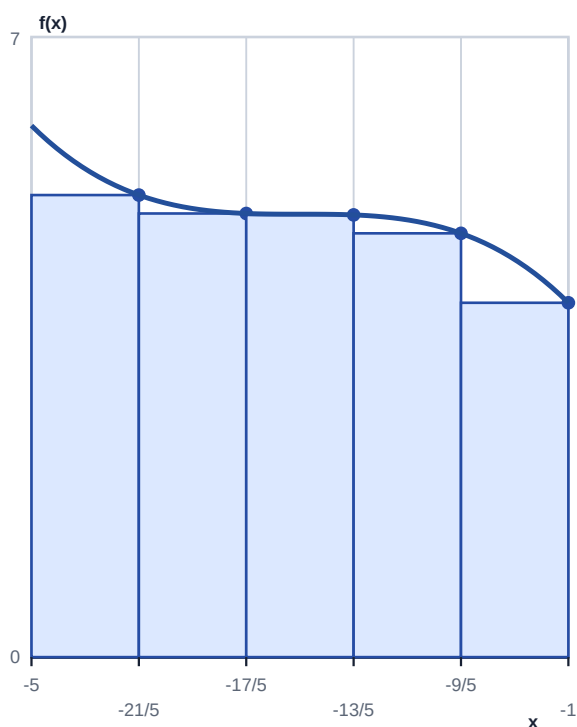
$$\text{Heights: } 3, 9/2, 5, 9/2.$$

$$\text{Height sum} = 17.$$

$$\text{Area estimate} = 1 \times 17 = 17 \text{ (about 17.000).}$$

8. Right endpoint; $n = 5$

$$f(x) = 5 - ((x + 3)/2)^3; \text{ interval } [-5, -1]$$



$$\text{Width} = (-1 - (-5)) / 5 = 4/5.$$

$$\text{Selected x-values: } -21/5, -17/5, -13/5, -9/5, -1.$$

$$\text{Heights: } 652/125, 626/125, 624/125, 598/125, 4.$$

$$\text{Height sum} = 24.$$

$$\text{Area estimate} = 4/5 \times 24 = 96/5 \text{ (about 19.200).}$$