

1.1 Exercises

See www.CalcChat.com for worked-out solutions to odd-numbered exercises.

In Exercises 1–5, decide whether the problem can be solved using precalculus or whether calculus is required. If the problem can be solved using precalculus, solve it. If the problem seems to require calculus, explain your reasoning and use a graphical or numerical approach to estimate the solution.

- Find the distance traveled in 15 seconds by an object traveling at a constant velocity of 20 feet per second.
- Find the distance traveled in 15 seconds by an object moving with a velocity of $v(t) = 20 + 7 \cos t$ feet per second.
- A bicyclist is riding on a path modeled by the function $f(x) = 0.04(8x - x^2)$, where x and $f(x)$ are measured in miles. Find the rate of change of elevation at $x = 2$.

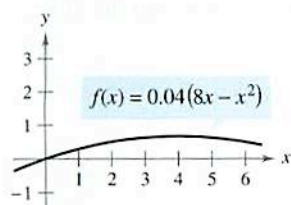


Figure for 3

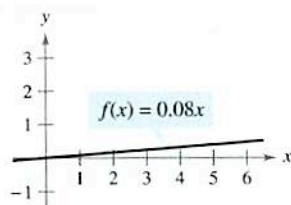
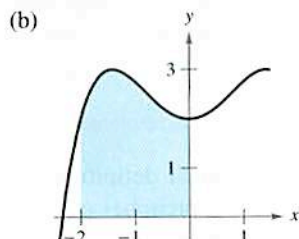
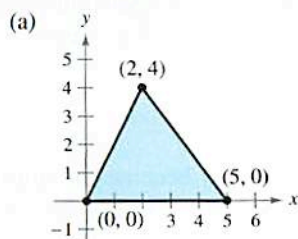


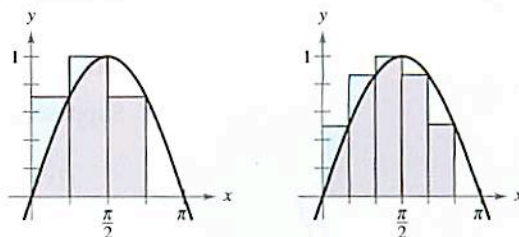
Figure for 4

- A bicyclist is riding on a path modeled by the function $f(x) = 0.08x$, where x and $f(x)$ are measured in miles. Find the rate of change of elevation at $x = 2$.
- Find the area of the shaded region.

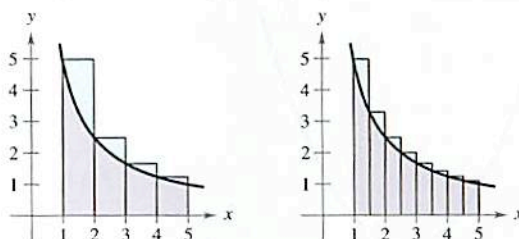


- Secant Lines** Consider the function $f(x) = \sqrt{x}$ and the point $P(4, 2)$ on the graph of f .
 - Graph f and the secant lines passing through $P(4, 2)$ and $Q(x, f(x))$ for x -values of 1, 3, and 5.
 - Find the slope of each secant line.
 - Use the results of part (b) to estimate the slope of the tangent line to the graph of f at $P(4, 2)$. Describe how to improve your approximation of the slope.
- Secant Lines** Consider the function $f(x) = 6x - x^2$ and the point $P(2, 8)$ on the graph of f .
 - Graph f and the secant lines passing through $P(2, 8)$ and $Q(x, f(x))$ for x -values of 3, 2.5, and 1.5.
 - Find the slope of each secant line.
 - Use the results of part (b) to estimate the slope of the tangent line to the graph of f at $P(2, 8)$. Describe how to improve your approximation of the slope.

- (a) Use the rectangles in each graph to approximate the area of the region bounded by $y = \sin x$, $y = 0$, $x = 0$, and $x = \pi$.



- Describe how you could continue this process to obtain a more accurate approximation of the area.
- (a) Use the rectangles in each graph to approximate the area of the region bounded by $y = 5/x$, $y = 0$, $x = 1$, and $x = 5$.



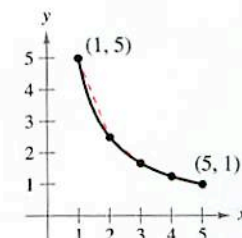
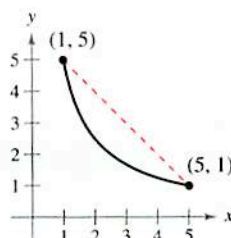
- Describe how you could continue this process to obtain a more accurate approximation of the area.

CAPSTONE

- How would you describe the instantaneous rate of change of an automobile's position on the highway?

WRITING ABOUT CONCEPTS

- Consider the length of the graph of $f(x) = 5/x$ from $(1, 5)$ to $(5, 1)$.



- Approximate the length of the curve by finding the distance between its two endpoints, as shown in the first figure.
- Approximate the length of the curve by finding the sum of the lengths of four line segments, as shown in the second figure.
- Describe how you could continue this process to obtain a more accurate approximation of the length of the curve.