



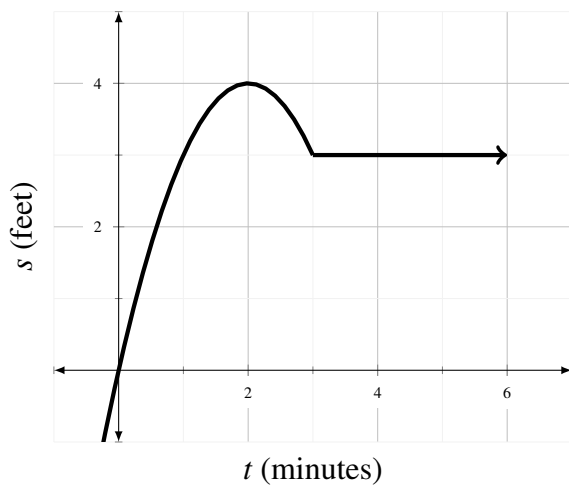
3. Suppose  $N$  represents the number of people in the United States who travel by car to another state for a vacation this Memorial Day weekend when the average price of gasoline is  $p$  dollars per gallon.

(a) What are the units of  $dN/dp$ ?

(b) In the context of the problem, write a sentence interpreting  $\frac{dN}{dp}$ .

(c) Would you expect  $dN/dp$  to be positive or negative? Explain your answer.

4. The graph of  $f(x)$  is sketched below. On a separate set of axes, give a rough sketch  $f'(x)$ .



5. Find the domain of each function.

(a)  $f(x) = \sqrt{x^2 - x - 6}$

(b)  $g(t) = \ln(t + 6)$

6. State the definition of “The function  $f(x)$  is continuous at  $x = a$ ”.

7. Suppose

$$f(x) = \begin{cases} -\frac{2}{x} & x < 2 \\ \frac{x}{x-3} & x \geq 2 \end{cases}$$

Is  $f(x)$  continuous at  $x = 0$ ? At  $x = 2$ ? Justify your answers using the definition of continuity.

8. Find the limit or show that it does not exist. *Make sure you are writing your mathematics correctly and clearly.*

(a)  $\lim_{x \rightarrow \infty} \frac{10^x - 1}{3 - 10^x}$

(b)  $\lim_{x \rightarrow \infty} \frac{\sqrt[3]{8x^3 + 1}}{2 - 5x}$

9. Consider a function with vertical asymptotes at  $x = -1$  and  $x = 3$  and a horizontal asymptote at  $y = 4/3$ .

(a) Write a formula for such a function.

(b) Sketch the graph of the function.

10. Solve for  $x$ .

(a)  $e^{x-3} + 2 = 6$

(c)  $\ln x + \ln(x - 1) = 0$

(b)  $\ln(x + 5) - 3 = 7$

(d)  $\cos(8x) = 0$

11. Use the Intermediate Value Theorem to show  $\ln x = x - 5$  has a solution. (Hint: Show there is a solution in the interval  $[1, e^5]$ .)

12. Sketch each of the functions below. Label all  $x$ - and  $y$ -intercepts and asymptotes. State, in interval notation, the domain and range of each function next to its graph.

(a)  $y = 6 - x^4$

(d)  $y = \tan^{-1} x$

(g)  $y = -2/(x + 3)$

(b)  $y = \sin(2x)$

(e)  $y = e^{x-1} + 2$

(h)  $y = \sqrt{x + 5}$

(c)  $y = \tan x$

(f)  $y = \ln x$