

Due date: _____

Name: _____

1. Write the definition of the derivative of a function $f(x)$.
2. Find the derivative of $f(x) = 3x^2 - x$ using the limit definition. Then find an equation for the tangent line at $x = 2$.
3. Find the derivative of $f(x) = x^2 + 2x$ using the limit definition. Then find the rate of change of f at $x = 5$.

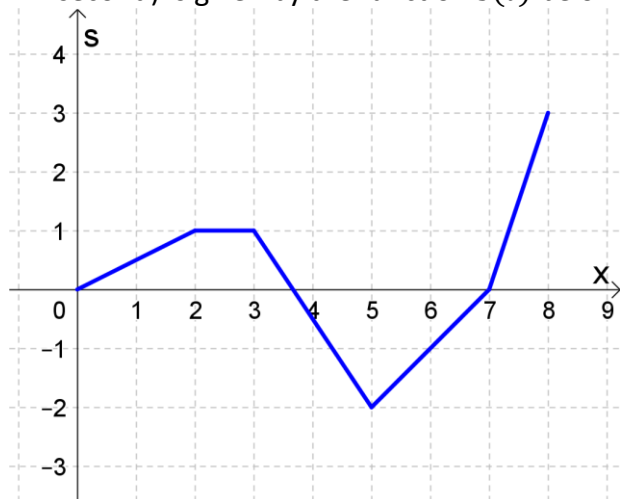
4. Find the derivative of $f(x) = \sqrt{2x + 3}$ using the limit definition. Then find the slope of the tangent line at $x = 3$.

5. Find the derivative of $f(x) = \sqrt{4 - x}$ using the limit definition. Then find the rate of change of f at $x = 1$.

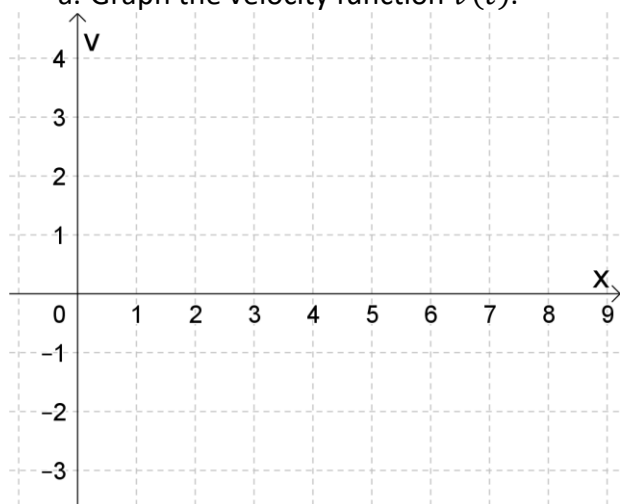
6. Find the derivative of $f(x) = \frac{2}{x+1}$ using the limit definition. Then find an equation for the tangent line at $x = -2$.

7. Find the derivative of $f(x) = \frac{1-x}{x+2}$ using the limit definition. Then find an equation for the tangent line at $x = 0$.

8. Suppose you move back and forth along a line, and that your position (in feet) over time (in second) is given by the function $s(t)$ below.



- a. Graph the velocity function $v(t)$.



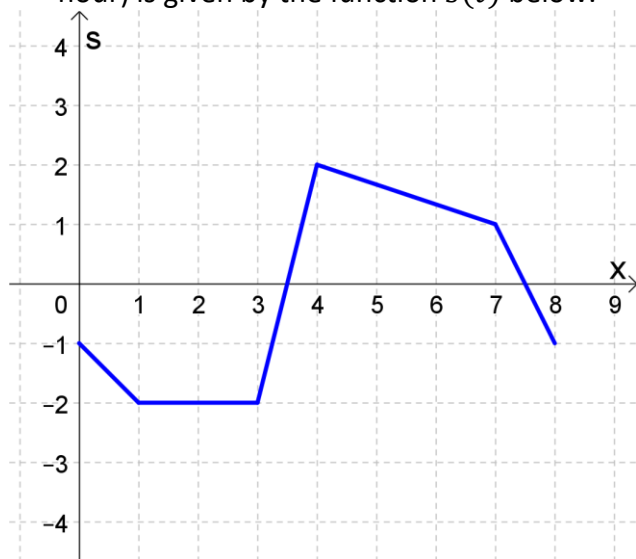
- b. Find $s'(1)$. Answer: _____
- c. Find $v(4)$. Answer: _____
- d. Find $s'(5)$. Answer: _____

9. Is $f(x) = |x - 2|$ continuous at $x = 2$? Is it differentiable at $x = 2$? (Hint: Draw the graph of f !)

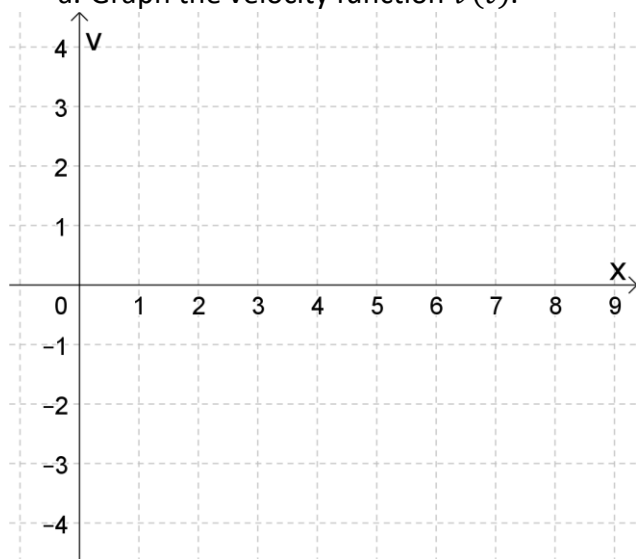
10. Write a formula for a function that is continuous at $x = -1$, but not differentiable at $x = -1$.

11. $f(x)$ is differentiable at $x = 2$. Does that mean that f must also be continuous at $x = 2$?

12. Suppose you move back and forth along a line, and that your position (in miles) over time (in hour) is given by the function $s(t)$ below.



a. Graph the velocity function $v(t)$.

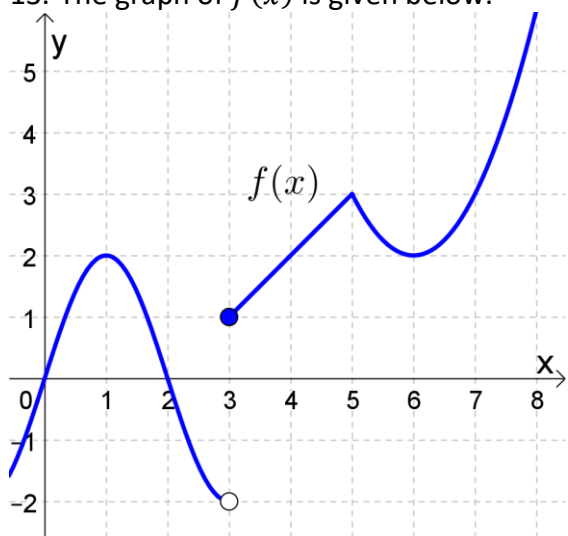


b. Find $v(2)$. Answer: _____

c. Find $v(3)$. Answer: _____

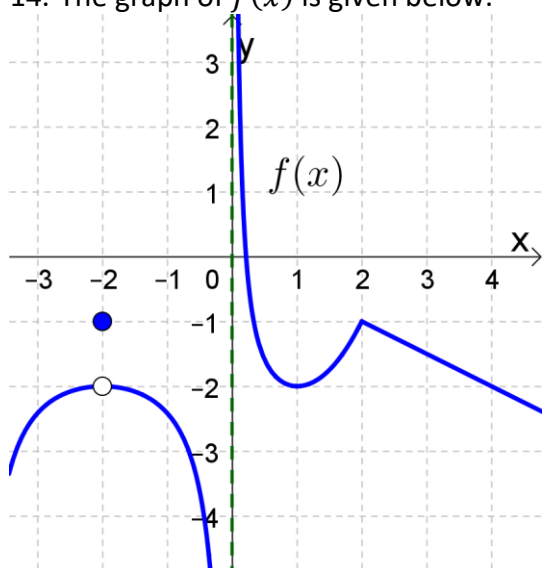
d. Find $s'(5)$. Answer: _____

13. The graph of $f(x)$ is given below.



- Find the x -value(s) where $f'(x) = 0$. Answer: _____
- Find the x -value(s) where f is not differentiable. Answer: _____
- Find $f'(3.5)$. Answer: _____
- Find an equation of the tangent line at $x = 1$. Answer: _____
- Find an equation of the tangent line at $x = 6$. Answer: _____
- Find an equation of the tangent line at $x = 4$. Answer: _____
- Find $\lim_{x \rightarrow 3^-} f(x)$. Answer: _____
- Find $\lim_{x \rightarrow 5} f(x)$. Answer: _____
- Find $\lim_{x \rightarrow \infty} f(x)$. Answer: _____
- Find $\lim_{x \rightarrow 2} f(x)$. Answer: _____

14. The graph of $f(x)$ is given below.



- Find the x -value(s) where $f'(x) = 0$. Answer: _____
- Find the x -value(s) where f is not differentiable. Answer: _____
- Find $f'(3)$. Answer: _____
- Find an equation of the tangent line at $x = 1$. Answer: _____
- Find an equation of the tangent line at $x = 3$. Answer: _____
- Find $\lim_{x \rightarrow -2} f(x)$. Answer: _____
- Find $\lim_{x \rightarrow 0^-} f(x)$. Answer: _____
- Find $\lim_{x \rightarrow 2} f(x)$. Answer: _____
- Find $\lim_{x \rightarrow \infty} f(x)$. Answer: _____

Q: A man goes into a bar and asks for a glass of water. The barman pulls out a gun, and points it at the customer. "Thank you" replies the customer and walks out. What happened?

Optional exercises from the Stewart textbook if you'd like more practice:

2.7 (p.148) #5, 7, 9ab, 11, 13, 27, 31-35 odd

2.8 (p.160) #3-11 odd, 21-29 odd