Who's Who on Halloween?

Amari, Francisca, Jamirea, Micaiah, and Senad live in the same neighborhood. On Halloween, they each go out trick-or-treating, but they each start at slightly different times, wear a different costume, and have different favorite candies they like to collect. For each derivative problem you solve, you'll receive a clue from one of the neighbors about what they saw that night. Can you figure out who's who on Halloween, including what time each person started trick-or-treating, what their favorite candy is, and what costume they were in?

		First Names					Favorite Candy					Costume				
		Amari	Francisca	Jamirea	Micaiah	Senad	M&Ms	Starbursts	Twix	Air Heads	Mounds	Chef	Banana	Ghost	Lumberjack	Pirate
Time	5:45															
	6:00															
	6:30															
	6:45															
	7:00															
Costume	Chef															
	Banana															
	Ghost															
	Lumberjack															
	Pirate															
Favorite Candy	M&Ms															
	Starbursts															
	Twix															
	Air Heads															
	Mounds															

1. The person whose favorite candy is Air Heads started trick-or-treating before Senad.

2. The 5 people are the person whose favorite candy is Air Heads, the pirate, Micaiah, the person who started trick-or-treating at 7 PM and the person whose favorite candy is Twix.

3. Of the chef and Senad, one started trick-or-treating at 5:45 PM and the other has Twix as their favorite candy.

4. Francisca started trick-or-treating at 5:45 PM.

5. Jamirea is either the ghost or the lumberjack.

6. The ghost started trick-or-treating after the banana.

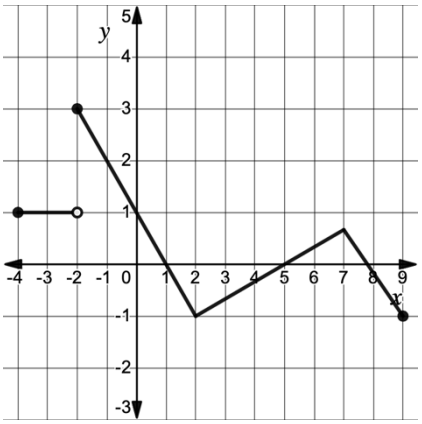
7. The person whose favorite candy is M&Ms is neither the ghost nor the banana.

8. The person who started trick-or-treating at 6:30 has Starbursts as their favorite candy.

9. The person who started trick-or-treating at 6:45 was not the banana.

10. The banana started trick-or-treating after Senad.

1. The graph of $y = f(x)$ is shown.



Evaluate $\lim_{h \to 0} \frac{f(3+h)-f(3)}{h}$

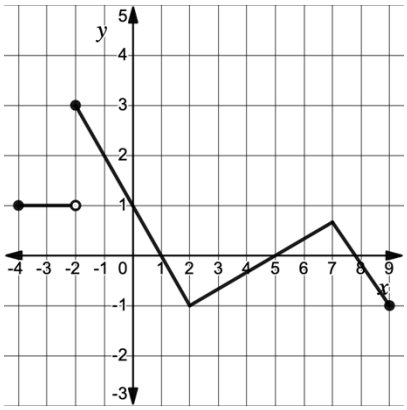
2. Find the derivative of each function.

   $f(x) = \ln(4x)$

   $g(x) = (3x - 5)^2$

   $h(x) = \sec x$

3. The graph of $y = f(x)$ is shown below for $-4 \leq x \leq 9$. For which value(s) of x is f continuous but not differentiable?



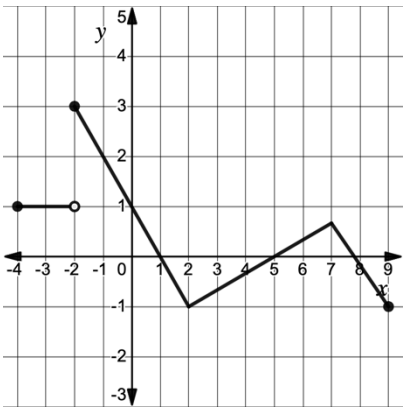
4. Selected values of f, g, and their derivatives are given in the table.

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
-3	10	1	-1	3
-1	4	-2	-3	0
2	1	-5	0	-2
5	-2	-3	2	8
8	-5	11	7	-3.5
11	5	8	13	1

Let $h(x) = f(x) \cdot g(x)$. Find $h'(8)$.

5. Let $j(x) = 5x^3 - kx^2 + 10x + m$ for some constants k and m. If $j(2) = -10$ and $j'(2) = 6$, find the values of k and m.

6. The graph of $y = f(x)$ is shown below. Order the following from least=1 to greatest=4.



_____ $\lim_{x \to -1} \frac{f(x)-f(-1)}{x+1}$

_____ The average rate of change of f on the interval [3,6]

_____ $\frac{f(4)-f(-1)}{5}$

_____ $f'(-3)$

7. Selected values of f, g, and their derivatives are given in the table.

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
-3	10	1	-1	3
-1	4	-2	-3	0
2	1	-5	0	-2
5	-2	-3	2	8
8	-5	11	7	-3.5
11	5	8	13	1

Let $k(x) = \frac{g(x)}{f(x)}$. Find $k'(-1)$.

8. If $f(x) = \frac{\cos^2 x}{\sin x}$, find $f'(x)$.

9. Selected values of f, g, and their derivatives are given in the table.

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
-3	10	1	-1	3
-1	4	-2	-3	0
2	1	-5	0	-2
5	-2	-3	2	8
8	-5	11	7	-3.5
11	5	8	13	1

Let $j(x) = f\big(g(x)\big)$. Find $j'(5)$.

10. Let $f(x) = x^2 + 5x$ and let g be a function so that $g'(x) = 3$ for all x.
If $h(x) = f\big(g(x)\big)$ and $h'(x) = 18x + 57$, write an equation for $g(x)$.