

1. Flu is spreading through a small school. At time t days after the beginning of the epidemic, there are $N(t)$ students sick, where $N(t) = 20t - t^2$. What is the average rate of change of the number of sick students from $t = 2$ to $t = 5$? Interpret your answer in a sentence, using appropriate units.

From the 2nd to the 5th day after the beginning of the epidemic, it is spreading at a rate of 13 students per day.

2. The function f is defined by the graph shown. Based on this graph,

(a) $\lim_{x \rightarrow -1^-} f(x) = 3$

(b) $\lim_{x \rightarrow -1^+} f(x) = 3$

(c) $\lim_{x \rightarrow -1} f(x) = 3$

(d) $f(-1) = 5$

- (e) Is f continuous at $x = -1$? Why or why not? Use limits in your answer.

Not continuous because $\lim_{x \rightarrow -1} f(x) \neq f(-1)$

(f) $\lim_{x \rightarrow 3^-} f(x) = -5$

(g) $\lim_{x \rightarrow 3^+} f(x) = 2$

(h) $\lim_{x \rightarrow 3} f(x) DNE$

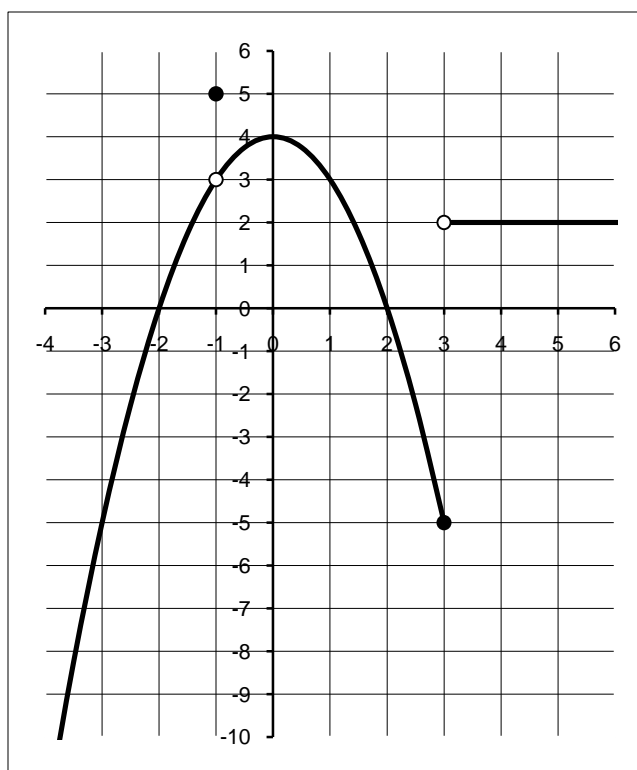
(i) $f(3) = -5$

- (j) Is f continuous at $x = 3$? Why or why not? Use limits in your answer.

Not continuous because $\lim_{x \rightarrow 3} f(x)$ does not exist.

- (k) Is f continuous at $x = 2$? Why or why not? Use limits in your answer.

It is continuous because $\lim_{x \rightarrow 2} f(x) = f(2)$.



3. Find each limit algebraically. If the limit does not exist, state this.

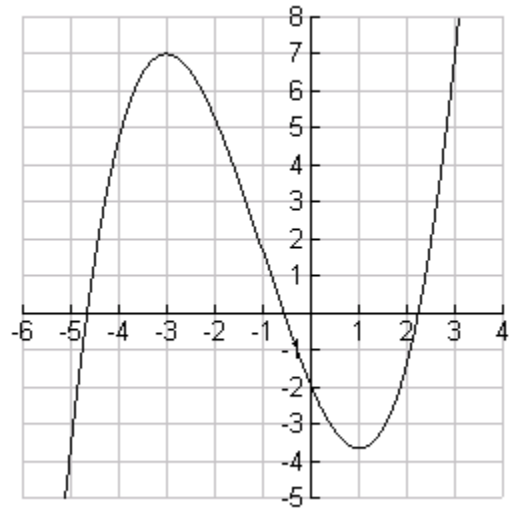
(a) $\lim_{x \rightarrow 3} \frac{5}{x} = \frac{5}{3}$

(b) $\lim_{x \rightarrow 2} \frac{x}{x-2} \text{ DNE}$

(c) $\lim_{x \rightarrow 3} \frac{x^2 + 5x - 24}{x^2 + x - 12} = \frac{11}{7}$

4. The graph of a function $f(x)$ is shown. Based on this graph, for each value of x given, state whether $f'(x)$ is positive, negative, or zero.

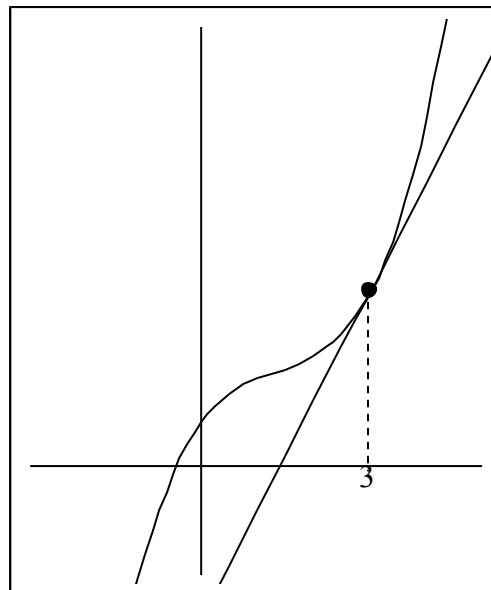
x	Is $f'(x)$ zero, negative or positive?
-4	positive
0	negative
1	zero



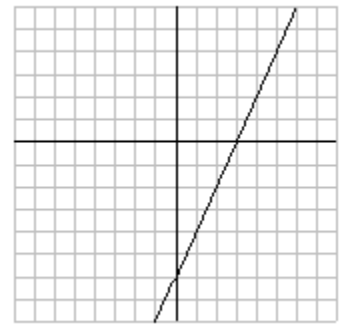
5. The graph of a function $f(x)$ and its tangent line at $x = 3$ are shown. The equation of the tangent line is $y = 10x - 14$. Based on this graph, determine the value of

(a) $f(3) = 16$

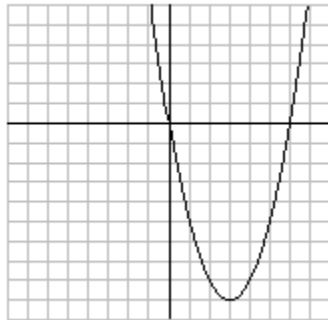
(b) $f'(3) = 10$



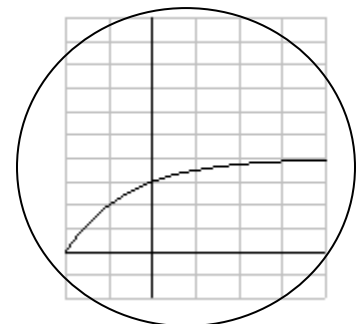
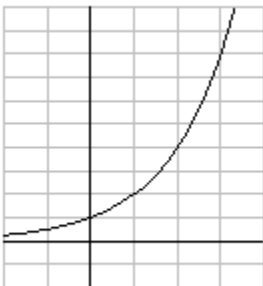
Graph of $f'(x)$



9. The graph of $f'(x)$, the derivative of a function f is shown.
- On what intervals is the function f increasing?
 $(3, \infty)$
 - On what intervals is the function f decreasing?
 $(-\infty, 3)$
 - At what value of x , if any, does f have a local minimum?
 $x = 3$
 - At what value of x , if any, does f have a local maximum?
None
 - If it is also known that $f(0) = 0$, sketch a possible graph of f .



10. Suppose it is known that $f'(x) > 0$ for all x and $f''(x) < 0$ for all x . Which of the following could be the graph of $f(x)$?



Answers for problems on Review Sheet for Test #1

- $A(x) = x \left(\frac{500 - 5x}{2} \right) = 250x - \frac{5}{2}x^2$
- (a) $x = 0$ (b) $x = -2, x = 0$ (c) Yes (d) No