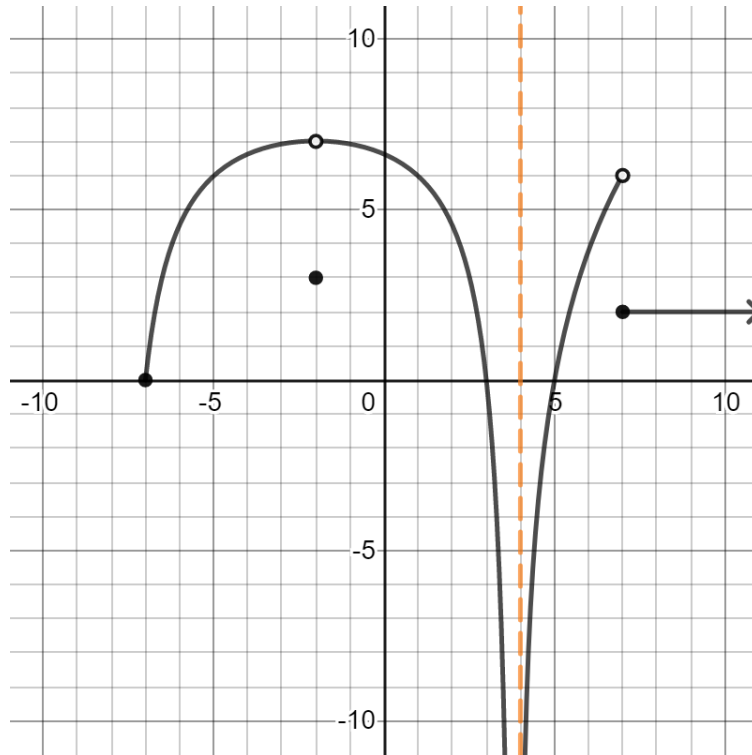


Limit Chapter Test: Version A

Name: _____ Date: October 11, 2019

1. Given the following graph of $f(x)$, determine the following limits:



(a) (1 point) $\lim_{x \rightarrow -7} f(x)$

(b) (1 point) $\lim_{x \rightarrow -2} f(x)$

(c) (1 point) $\lim_{x \rightarrow 4} f(x)$

(d) (1 point) $\lim_{x \rightarrow 7^-} f(x)$

(e) (1 point) $\lim_{x \rightarrow \infty} f(x)$

2. Determine the following limits.

(a) (1 point) $\lim_{x \rightarrow -3} 5$

(b) (1 point) $\lim_{x \rightarrow 2} \frac{x^2 + 4}{6 - 7x}$

(c) (2 points) $\lim_{x \rightarrow -4} \frac{x^2 - x - 20}{2x^2 + 11x + 12}$

(d) (2 points) $\lim_{x \rightarrow 1} \frac{\sqrt{x+3} - 2}{x - 1}$

(e) (2 points) $\lim_{x \rightarrow 3} \frac{x^2 + 9}{x - 3}$

(f) (2 points) $\lim_{h \rightarrow 0} \frac{(5 + h)^2 - 25}{h}$

(g) (2 points) $\lim_{h \rightarrow 0} \frac{\frac{1}{3+h} - \frac{1}{3}}{h}$

3. Consider the function

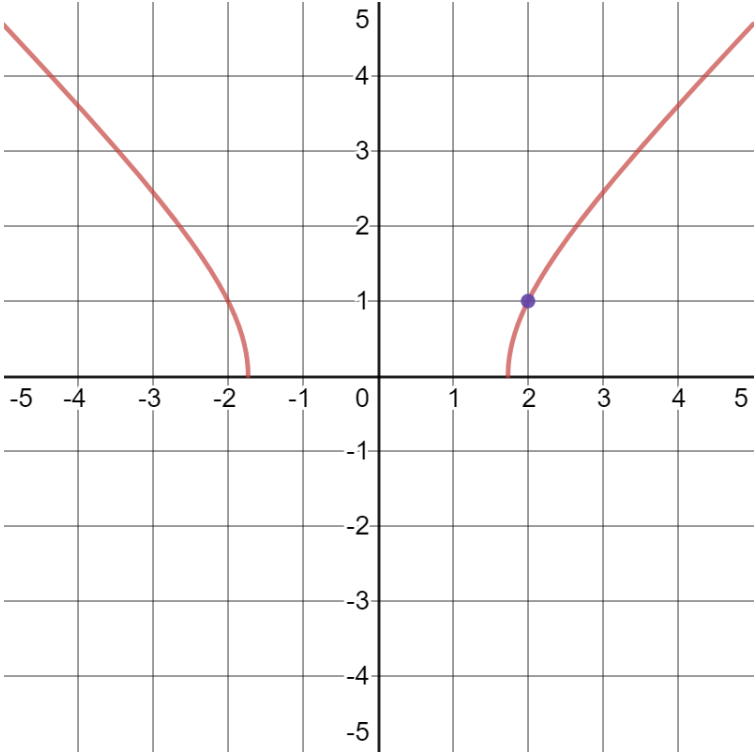
$$g(x) = \begin{cases} 2^x + 5 & x < 0 \\ k & x = 0 \\ 6 - x & 0 < x \leq 4 \\ \sqrt{x-1} & x > 4 \end{cases}$$

Use the definition of continuity to answer the following questions about $g(x)$.

(a) (2 points) Show that $g(x)$ is discontinuous at $x = 4$.

(b) (2 points) Determine the value of k so that $g(x)$ is continuous at $x = 0$.

4. (4 points) Given the function $h(x) = \sqrt{x^2 - 3}$



Determine the equation of the tangent line that passes through the point $(2, 1)$. Draw the line on the graph above.

5. (3 points) A car travelling at 50km/h begins breaking infront of a crosswalk. It's position relative to the crosswalk is shown by the function

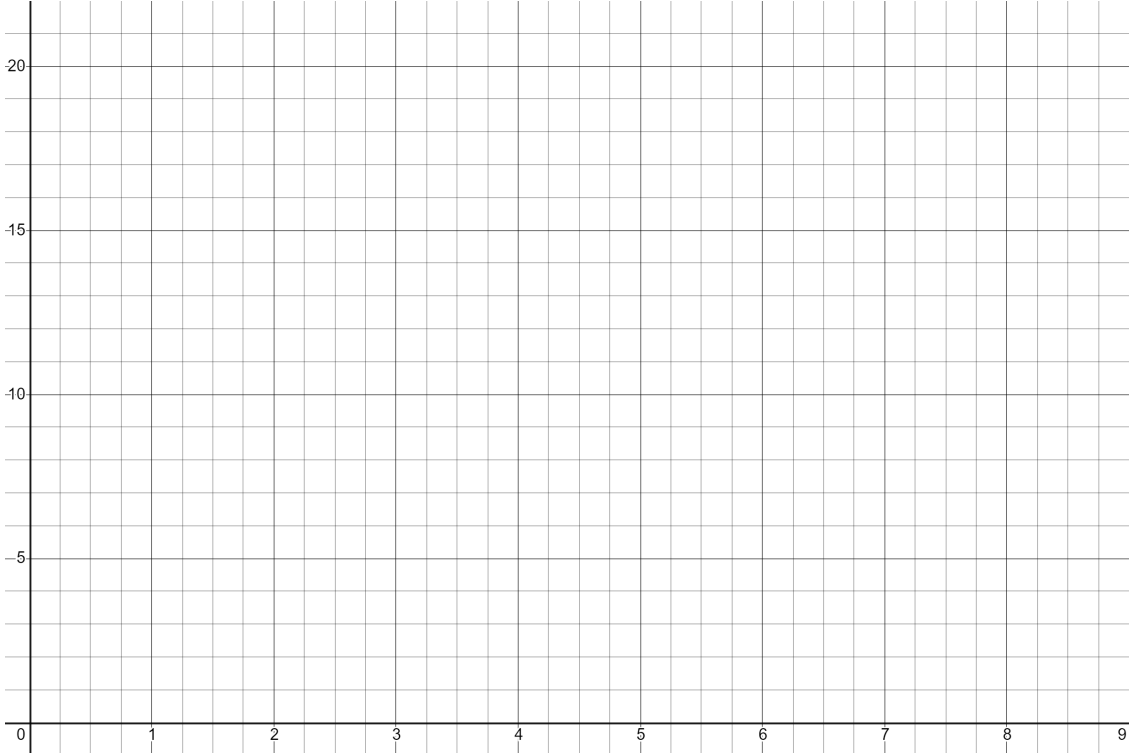
$$d(t) = -20 + 13.9t - 2.3t^2$$

where $d(t)$ is the distance from the crosswalk t seconds after it begins breaking. Determine the instantaneous velocity when $t = 3$.

6. (3 points) An irregularly shaped water bottle is being filled with water and the height of water is measured every second. The data is given below.

Time (seconds)	0	1	2	3	4	5	6	7	8
Height (cm)	0	2.0	5.5	8.5	11	13.0	14.5	16.5	21.5

Graph the data and determine the instantaneous rate of change of the height of water at 5 and 7 seconds.



7. (1 point (bonus)) Determine the exact limit of the following

$$\lim_{x \rightarrow 2} \frac{\sqrt{x^3 - 3x^2 + 4}}{|1 - \frac{2}{x}|}$$