Name: ______________________________ Date: __________________________

MCV4U Limits Quiz

1. **[5 marks]** Evaluate the following limits from the graph of $y = f(x)$ shown below:

a. $\lim\limits_{x \to -6^-} f(x) =$ -2

b. $\lim\limits_{x \to -6^+} f(x) =$ 2.5

$f(-6) = -2$

c. $\lim\limits_{x \to -6} f(x) =$ DNE

d. $\lim\limits_{x \to -1^-} f(x) =$ 5

e. $\lim\limits_{x \to -1^+} f(x) =$ 5

$f(-1) = 5$

f. $\lim\limits_{x \to -1} f(x) =$ 5

g. $\lim\limits_{x \to -4^-} f(x) =$ 6.5

h. $\lim\limits_{x \to -4^+} f(x) =$ 6.5

$f(-4) = 6.5$

i. $\lim\limits_{x \to -4} f(x) =$ 6.5

j. $\lim\limits_{x \to 4^-} f(x) =$ 4

k. $\lim\limits_{x \to 4^+} f(x) =$ 4

l. $\lim\limits_{x \to 4} f(x) =$ 4

$x = 4, y = ?$

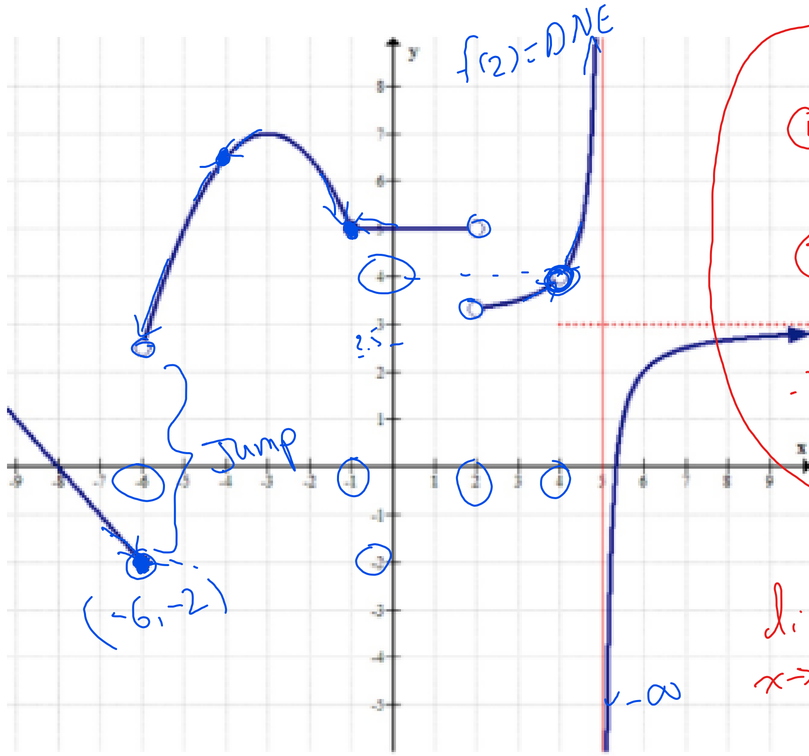
$f(4) = DNE$

V.A m. $\lim\limits_{x \to 5^-} f(x) =$ $+\infty$

n. $\lim\limits_{x \to 5^+} f(x) =$ $-\infty$

o. $\lim\limits_{x \to 5} f(x) =$ DNE

Jump V.A. at x



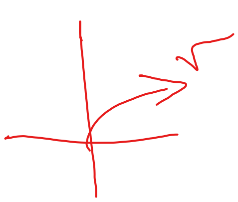
① $\lim\limits_{x \to a^-} f(x) = L$

② $\lim\limits_{x \to a^+} f(x) = L$

$\therefore \lim\limits_{x \to a} f(x) = L$

$\lim\limits_{x \to a^-} f(x) \neq \lim\limits_{x \to a^+} f(x)$

$\therefore \lim\limits_{x \to a} f(x) = DNE$



2. **[5 marks]** Given g(x), evaluate the following limits algebraically.

$$g(x)=\begin{cases}2x+1, & x\le 2 \\ x^2+1, & 2<x\le 5 \\ 5-x, & x>5\end{cases}$$

left

Right left of 5

right of 5

a) $\lim_{x\to 2} g(x)$

$$\lim_{x\to 2^-} g(x) = \lim_{x\to 2^-} 2x+1$$
$$= 2(2)+1$$
$$= 5$$

$$\lim_{x\to 2^+} g(x) = \lim_{x\to 2^+} x^2+1$$
$$= 2^2+1$$
$$= 5$$

Since $\lim_{x\to 2^-} g(x) = \lim_{x\to 2^+} g(x) = 5$

$\therefore \lim_{x\to 2} g(x) = 5$

b) $\lim_{x\to 5} g(x)$

$$\lim_{x\to 5^-} g(x) = \lim_{x\to 5^-} x^2+1$$
$$= 5^2+1$$
$$= 26$$

$$\lim_{x\to 5^+} g(x) = \lim_{x\to 5^+} 5-x$$
$$= 5-5$$
$$= 0$$

Since $\lim_{x\to 5^-} g(x) \neq \lim_{x\to 5^+} g(x)$

$\therefore \lim_{x\to 5} g(x) = \text{DNE}$