left→smaller
right→bigger

1. Consider the following piece-wise defined function: $f(x) = \begin{cases} 1 - 3x + 2x^2 & \text{if } x < -2 \\ 25 + 3x - x^2 & \text{if } x > -2 \end{cases}$

Find the following limits:

a) 2 $\lim_{x \to -2^-} f(x)$ 15 b) 2 $\lim_{x \to -2^+} f(x)$ 15 c) $\lim_{x \to -2} f(x)$ 15 d) 2 $\lim_{x \to -3} f(x)$ 28 e) 2 $\lim_{x \to -1} f(x)$ 21

2. Consider the following piece-wise defined function: $f(x) = \begin{cases} 3 + 2x + x^2 & \text{if } x < 2 \\ 6 + 2x + x^2 & \text{if } x \geqslant 2 \end{cases}$

Find the following limits:

a) 2 $\lim_{x \to 2^-} f(x)$ 11 b) 2 $\lim_{x \to 2^+} f(x)$ 14 c) $\lim_{x \to 2} f(x)$ DNE d) 2 $\lim_{x \to 1} f(x)$ 6 e) 2 $\lim_{x \to 3} f(x)$ 21

3. Consider the following piece-wise defined function: $f(x) = \begin{cases} -1 + 2x + 2x^2 & \text{if } x < 1 \\ 2 & \text{if } x = 1 \\ 6 & \text{if } x > 1 \end{cases}$

Find the following limits:

a) 1 $\lim_{x \to 1^-} f(x)$ 3 b) 3 $\lim_{x \to 1^+} f(x)$ 6 c) $\lim_{x \to 1} f(x)$ DNE d) 1 $\lim_{x \to 0} f(x)$ -1 e) 3 $\lim_{x \to 2} f(x)$ 6

4. Consider the following piece-wise defined function: $f(x) = \begin{cases} -3 + 2x - x^2 & \text{if } x < -1 \\ -3 + 2x - x^2 & \text{if } x \geqslant -1 \end{cases}$

Find the following limits:

a) 2 $\lim_{x \to -1^-} f(x)$ -6 b) 2 $\lim_{x \to -1^+} f(x)$ -6 c) $\lim_{x \to -1} f(x)$ -6 d) 2 $\lim_{x \to -2} f(x)$ -11 e) 2 $\lim_{x \to 0} f(x)$ -3

5. Consider the following piece-wise defined function: $f(x) = \begin{cases} 3 & \text{if } x < 1 \\ 2 & \text{if } x = 1 \\ 8 - x - x^2 & \text{if } x > 1 \end{cases}$

Find the following limits:

a) $\lim_{x \to 1^-} f(x)$ b) $\lim_{x \to 1^+} f(x)$ c) $\lim_{x \to 1} f(x)$ d) $\lim_{x \to 0} f(x)$ e) $\lim_{x \to 2} f(x)$

6. Consider the following piece-wise defined function: $f(x) = \begin{cases} -4 + 2x + x^2 & \text{if } x < -2 \\ -15 - 3x + 2x^2 & \text{if } x > -2 \end{cases}$

Find the following limits:

a) $\lim_{x \to -2^-} f(x)$ b) $\lim_{x \to -2^+} f(x)$ c) $\lim_{x \to -2} f(x)$ d) $\lim_{x \to -3} f(x)$ e) $\lim_{x \to -1} f(x)$

7. Consider the following piece-wise defined function: $f(x) = \begin{cases} 2 - x - 2x^2 & \text{if } x < 3 \\ -10 & \text{if } x = 3 \\ -37 + x + 2x^2 & \text{if } x > 3 \end{cases}$

Find the following limits:

a) $\lim_{x \to 3^-} f(x)$ b) $\lim_{x \to 3^+} f(x)$ c) $\lim_{x \to 3} f(x)$ d) $\lim_{x \to 2} f(x)$ e) $\lim_{x \to -1} f(x)$

$\begin{cases} 1 + 2x + 2x^2 & \text{if } x < 1 \end{cases}$