Given $f(x) = \begin{cases} 2x+3, & \textbf{if } x < 1 \\ 4, & \textbf{if } x = 1 \\ x^2+2, & \textbf{if } x > 1 \end{cases}$

(a) Find $\lim_{x\to 1^+} f(x)$**.**

x	$f(x)$
1.1000	3.2100
1.0100	3.0201
1.0010	3.0020
1.0001	3.0002

As x approaches 1 from the right, $f(x)$ approaches 3.
Thus, $\lim_{x\to 1^+} f(x) = 3$

(b) Find $\lim_{x\to 1^-} f(x)$**.**

x	$f(x)$
0.9000	4.8000
0.9900	4.9800
0.9990	4.9980
0.9999	4.9998

As x approaches 1 from the left, $f(x)$ approaches 5.
Thus, $\lim_{x\to 1^-} f(x) = 5$

(c) Find $\lim_{x\to 1} f(x)$**.**

$$\lim_{x\to a} = L \iff \lim_{x\to a^+} = L = \lim_{x\to a^-} \tag{1}$$

Given that $\lim_{x\to 1^-} f(x) = 5 \neq \lim_{x\to 1^+} f(x) = 3$, it follows that the limit of $f(x)$ as x approaches a does not exist.

Given $f(x) = \begin{cases} x+1, & \textbf{if } x < -1 \\ x^2, & \textbf{if } -1 \leq x \leq 1 \\ 2-x, & \textbf{if } x > 1 \end{cases}$

(c) Find $\lim_{x\to -1} f(x)$**.**

Given that $\lim_{x\to 1^-} f(x) = 5 \neq \lim_{x\to 1^+} f(x) = 3$, it follows that the limit of $f(x)$ as x approaches a does not exist (1).