# Math 124 Quiz #1 Solutions

1. (a) $\lim_{x \to 1^-} f(x) = 2$ since the $y$-values of $f(x)$ approach 2 as $x$ approaches 1 from the left.

   (b) $\lim_{x \to 1^+} f(x) = 0$ since the $y$-values of $f(x)$ approach 2 as $x$ approaches 1 from the right.

   (c) $\lim_{x \to 2} f(x) = +\infty$ since the $f(x)$ increases without bound as $x$ approaches 2 from the left and from the right.

   (d) $\lim_{x \to 3} f(x) = 1$ since the $y$-values of $f(x)$ approach 2 as $x$ approaches 3.

2. (a)
$$\begin{aligned}\lim_{x \to 2}\left((x+1)\sqrt{3x^2 - x + 6}\right) &= \lim_{x \to 2}(x+1) \cdot \sqrt{\lim_{x \to 2}(3x^2 - x + 6)} \\ &= (2+1) \cdot \sqrt{3(2^2) - 2 + 6} \\ &= 3 \cdot \sqrt{16} \\ &= 12\end{aligned}$$

   (b)
$$\lim_{t \to -2} \frac{2t^2 + 4t}{t^2 + t - 2} = \lim_{t \to -2} \frac{2t(t+2)}{(t+2)(t-1)} = \lim_{t \to -2} \frac{2t}{t-1} = \frac{2(-2)}{-2-1} = \frac{4}{3}$$

   (c)
$$\lim_{t \to 1^+} \frac{3t^2 + 6t}{t^2 + t - 2} = \lim_{t \to 1^+} \frac{3t(t+2)}{(t+2)(t-1)} = \lim_{t \to 1^+} \frac{3t}{t-1} = +\infty$$

   Note: As $t$ approaches 1 with $t > 1$, the numerator is approaching 3 and the denominator is approaching 0. $\Rightarrow$ This is an infinite limit.

   If $t > 1$, the denominator $t - 1$ is positive. So, for $t$ near 1 with $t > 1$, the numerator and denominator are positive, which tells us that the function is growing without bound.