Math 151 Quiz #2 Solutions

1. (a) $\lim_{x\to 2^+} f(x) = \infty$ since the function f increases without bound as x approaches 2 from the right.

   (b) $$\begin{aligned}\lim_{x\to 3} x^2 f(x) &= \lim_{x\to 3} x^2 \cdot \lim_{x\to 3} f(x)\\ &= 3^2 \cdot 1\\ &= 9\end{aligned}$$

   (c) $f(3) = 3$ since the point (3,3) is on the graph of f.

2. (a) $\lim_{x\to 2} \dfrac{3x-1}{x+1} = \dfrac{3(2)-1}{2+1} = \dfrac{5}{3}$ since $\frac{3x-1}{x+1}$ is defined at $x = 2$.

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

   (c) $\lim_{x\to 0^+} \csc x = \lim_{x\to 0^+} \dfrac{1}{\sin x} = +\infty$ since as $x \to 0^+$, $\sin x \to 0$ with $\sin x > 0$ ($\sin x$ is positive for values of x near and to the right of 0).

3. Note that $g(x) = \frac{x^2-6x+9}{x^3-9x} = \frac{(x-3)^2}{x(x-3)(x+3)} = \frac{x-3}{x(x+3)}$ for $x \neq 3$.

   Thus $g(x)$ will have the vertical asymptotes $x = 0$ and $x = -3$. (The denominator of the simplified form of g is equal to zero at these values. At $x = 3$, g has a hole in its graph instead of a vertical asymptote.)