MA125-6A Quiz 1

Name: Key

Exercise 1. *(5 points) Show the the equation*

$$3x^3 - 4x^2 + x - 1 = 0$$

has a solution between 1 and 2.

Let $f(x) = 3x^3 - 4x^2 + x - 1$. Since f is a polynomial, f is continuous on $(-\infty, \infty)$, specifically, it is continuous on $[1,2]$. Then since $f(1) = 3 - 4 + 1 - 1 = -1$ & $f(2) = 3(8) - 4(4) + 2 - 1 = 9$, the Intermediate Value Theorem says that there exists a c in $(1,2)$ such that $f(c) = 0$.

Exercise 2. *(5 points) Find*

$$\lim_{x\to 2^+} \frac{x}{2x-4} \quad \textit{and} \quad \lim_{x\to 2^-} \frac{x}{2x-4}.$$

$\lim_{x\to 2^+} \frac{x}{2x-4} = \infty$ since $\lim_{x\to 2^+} x = 2$ & $\lim_{x\to 2^+} \frac{1}{2x-4} = \infty$

$\lim_{x\to 2^-} \frac{x}{2x-4} = -\infty$ since $\lim_{x\to 2^-} x = 2$ & $\lim_{x\to 2^-} \frac{1}{2x-4} = -\infty$

Note: We can think of $\lim_{x\to 2^+} \frac{x}{2x-4}$ as $\lim_{x\to 2^+} \left[(x)\left(\frac{1}{2x-4}\right)\right]$.