MA125-6C Quiz 1

Name: Key

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

$$2x^4 - 3x^2 + x - 6 = 0$$

has a solution between 1 and 2.

Let $f(x) = 2x^4 - 3x^2 + x - 6$. Since f is a polynomial, it is continuous on $[1,2]$. Thus, we can apply the IVT.

$$f(1) = 2(1)^4 - 3(1)^2 + (1) - 6 = 2 - 3 + 1 - 6 = -6 < 0$$

$$f(2) = 2(2)^4 - 3(2)^2 + (2) - 6 = 32 - 12 + 2 - 6 = 16 > 0$$

Thus, the IVT tells us that there is a c in $(1,2)$ such that $f(c) = 0$.

Exercise 2. *(5 points) Find*

$$\lim_{x\to 3^+} \frac{x}{2x-6} \quad \textit{and} \quad \lim_{x\to 3^-} \frac{x}{2x-6}.$$

$$\lim_{x\to 3^+} \frac{x}{2x-6} = \infty \quad \text{since} \quad \lim_{x\to 3^+} x = 3 \;\&\; \lim_{x\to 3^+} \frac{1}{2x-6} = \infty$$

$$\lim_{x\to 3^-} \frac{x}{2x-6} = -\infty \quad \text{since} \quad \lim_{x\to 3^-} x = 3 \;\&\; \lim_{x\to 3^-} \frac{1}{2x-6} = -\infty$$

<u>Note</u>: We can think of $\lim_{x\to 3^\pm} \frac{x}{2x-6} = \lim_{x\to 3^\pm} \left((x)\left(\frac{1}{2x-6}\right)\right)$.