MATH 121 Section 02
Homework 1

Below is a list of selected problems from Stewart's Calculus. You have until the following Friday January 26 to finish this problem set. The first problems are suggested exercises and you do not need to turn them in. The latter set you should write up carefully and neatly as they will be graded. It is in your best interest to work all of the problems. All problems from the homework are fair game on the exams! You are encouraged to work in groups, but you must write up your own solutions. I will be available during office hours for help.

1 Suggested Problems

§2.2) 1, 3, 5, 7, 9, 13, 15, 23, 29

§2.3) 1, 2, 3, 7, 9, 10, 11, 13, 15, 17, 19, 23, 25, 27, 35, 39, 47

2 Required Problems

1) Write down (copy) the definition of a limit from §2.2 in the text. Rewrite the definition in your own words and include illustrations.

2) Let $p(x) = c_n x^n + c_{n-1}x^{n-1} + \cdots + c_1 x + c_0$ be a polynomial. Use the limit laws to show that
$$\lim_{x \to a} p(x) = p(a).$$

3) Consider the function
$$f(x) = \begin{cases} x^2 & \text{if } x \text{ is rational} \\ 0 & \text{if } x \text{ is irrational} \end{cases}$$
use the squeezing theorem to show that
$$\lim_{x \to 0} f(x) = 0.$$

4) Consider the Pharo function
$$P(x) = \begin{cases} 7 & \text{if } x \text{ is a rational number,} \\ -7 & \text{if } x \text{ is an irrational number.} \end{cases}$$
Use the ε, δ definition of a limit to explain why the limit does not exist at any point. Hint, in any interval (a, b) there exists both rational and irrational numbers.

5) Use the ε, δ definition for a limit to prove that
$$\lim_{x \to 4} 2x - 1 = 7.$$