Math 3210-02: Homework 1, September 10, 2019

Show all work!

Name:

Problem 1 (20 points)**.** Using induction prove that

$$\sum_{k=1}^{n}(2k-1) = n^2$$

for every $n \in \mathbb{N}$.

Problem 2 (20 points)**.** Let F be an ordered field. Show that $x < 0$ implies that $x^{-1} < 0$.

Problem 3 (20 points)**.** Prove that every rational solution of a polynomial equation

$$x^n + a_{n-1}x^{n-1} + \ldots + a_2x^2 + a_1x + a_0 = 0$$

with integer coefficients a_n is an integer.

Problem 4 (20 points)**.** Prove that

$$\lim \frac{\sin(n)}{n} = 0.$$

Problem 5 (20 points)**.** Does the sequence $(\sin(n))$ have a convergent subsequence? Why?