Math 220 – Homework 11

Due Thursday 11/21 at the beginning of class

Total points: 130 (Writing portion: 70 pts (all the problems marked by $*$).)

PART A

Problems from the textbook:

- Section 5.5

problem	1	2	4*	5(b)	6(a)*	6(b)	10*
points	24	16	10	10	10	10	10

PART B

1. * [10 points] Let $f : \mathbb{R} \to \mathbb{R}$ be defined by $f(x) = x^{2n}$, where $n \in \mathbb{N}$. Compute $f([-1, 0])$.*(Give a formal proof.)*
2. * [10 points] Let $f : \mathbb{R} \to \mathbb{R}$ be defined by $f(x) = 2019 - 3x$. Compute $f^{-1}([-3, 3])$.*(Give a formal proof.)*
3. * [10 points] In class we proved the following proposition:

   Let $f : X \to Y$. If $A_1 \subseteq A_2 \subseteq X$ then $f(A_1) \subseteq f(A_2)$.

   State the converse of this proposition and then disprove it.
4. * [10 points] For a function $f : X \to Y$ and subsets B_1 and B_2 of Y, prove that

$$f^{-1}(B_1 - B_2) = f^{-1}(B_1) - f^{-1}(B_2)$$