

Math 220 – Homework 8

Due Thursday 11/03 at the beginning of class

PART A

Problems from the textbook:

Section 3.1 # 1, 7, 10(a)

Section 3.2 # 1(e); 2(e); 9; 12(b,c); 13(c,e); 14(a,e);

PART B

1. Let $f : \mathbb{R} \rightarrow \mathbb{R}$ be defined by $f(x) = 2016 - 4x$. Prove that $\text{Im}f = \mathbb{R}$.
2. Let $f \in F(\mathbb{R})$ be defined by $f(x) = -x^{2n}$, where $n \in \mathbb{Z}^+$, and $S = \{y \in \mathbb{R} \mid y \leq 0\}$. Prove that $\text{Im}f = S$.
3. Determine whether the following function is injection. Give a formal proof of your answer.
 - (a) $f \in F(\mathbb{R})$ defined by $f(x) = 16x^{16} - 14x^{14} - 2x^2 + 1$
 - (b) $f \in F(\mathbb{Z})$ defined by $f(n) = \begin{cases} n + 2016, & \text{if } n \in \mathbb{E} \\ -n + 2016, & \text{if } n \in \mathbb{O} \end{cases}$
4. Determine whether the function $f \in F(\mathbb{Z})$ defined by $f(n) = \begin{cases} 2n, & \text{if } n \in \mathbb{E} \\ -n + 22, & \text{if } n \in \mathbb{O} \end{cases}$ is surjective.
Give a formal proof of your answer.