

Math 220 (HNR) – Homework 4

Due Thursday 02/16 at the beginning of class

Total points = 161

PART A

Problems from the textbook:

- Section 1.3 # 4 [22 points], 8 [22 points]
- Section 1.4 # 5 [6 points], 7 [6 points], 20[15 points], 23 [5 points]

PART B

- [16 points] For the statement “If $\sqrt{3} < \sqrt{7}$, then $3 < 7$.” write in a useful form
 - the converse;
 - the contrapositive;
 - the converse of contrapositive;
 - the contrapositive of converse.
- [12 points] For the statement “For every integer n , if n is divisible by 2 and n is divisible by 3, then n is divisible by 6.” write in a useful form
 - the converse;
 - the contrapositive.
- [10 points] Prove that if $n \in \mathbf{Z}$, then $n^3 + n$ is even.
- [10 points] Prove that $5x - 3y$ is even, then x and y are of the same parity.
- [10 points] Let $n \in \mathbf{Z}$. Prove that if $n^2 - 5 \in \mathbb{E}$, then $n^2 - 5 \in 4\mathbb{Z}$.
 - [5 points] Give an example of an integer n such that $n^2 - 5 \in \mathbb{E}$, but $n^2 - 5 \notin 8\mathbb{Z}$.
- [10 points] Prove that for all integers m and n , if the product mn is even, then m is even or n is even.
- [12 points] Prove or disprove the following statements:
 - For all positive integers x, y, z , $x^{y^z} = (x^y)^z$.
 - If $n \in \{0, 1, 2, 3, 4\}$, then $2^n + 3^n + n(n - 1)(n - 2)$ is prime.
 - For every integer n , if n is divisible by 2 and n is divisible by 6, then n is divisible by 12.