

## Math 220-HNR – Homework 2

Due Thursday 9/13 at the beginning of class

Total points: 195 (Problems marked by \* will count toward writing portion.)

### PART A

Problems from the textbook:

problem	2.34	2.50	2.58*	2.60	2.62*	2.68	2.86	2.92	2.100
points	24	16	10	16	10	10	5	5	32

### PART B

1. 8 points In each of the following statements identify the hypothesis (assumption) and conclusion.

- (a) If  $a$  is irrational, then  $2a$  is irrational.  
 (b)  $a^3$  is an even integer whenever  $a$  is an even integer.

2. Given a quantified statement

$$\forall x \in \mathbb{Z}^+, (\exists y \in \mathbb{Z}^+ \ni xy \in \mathbb{E}). \quad (1)$$

- (a) 3 points Express the given statement (1) in words.  
 (b) 6 points Express the **negation** of the given statement (1) in symbols. (**Do NOT use the symbol “ $\notin$ ”.**)  
 (c) 3 points Express the **negation** of the given statement (1) in words.

3. Given a quantified statement

$$\forall x \in \mathbb{R}, \exists n \in \mathbb{Z} \ni (n \leq x < n + 1). \quad (2)$$

- (a) 3 points Express the statement (2) in words.  
 (b) 8 points Express the **negation** of the statement (2) in symbols. (**Do NOT use the symbol “ $\notin$ ” and interval notation.**)

4. 36 points Express the following statements in the form “*For all ... , if ... then...*” using symbols to represent variables. Then write their negations in words, again using symbols to represent variables. (**Attention you should use symbols to represent introduced variables only. The statements and their negations must be written in words and not in symbols.**)

- (a) An integer is odd or even.  
 (b) All angles of a square are equal.  
 (c) The number  $-1$  is the largest negative integer.  
 (d) When the product of two integers is odd, then the both integers are odd.  
 (e) Every multiple of 6 is even and is not a multiple of 4.  
 (f) The square of an even integer is divisible by 4.