

## Math 220 – Homework 2 (HNR)

Due Thursday 09/15 at the beginning of class

### PART A

Problems from the textbook:

- Section 1.1 # 2(c,e,f,h); 3(c,e,f,h) 5(b,c,e,f); D1(a).
- Section 1.2 # 5(b,c,e); 13c; D4

### PART B

1. Express the following statements in symbols. (**Do not use** “ $\Rightarrow$ ”)

- Every even integer can be expressed as the sum of two odd integers.
- The square of any real number is positive.

2. Given a quantified statement

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

- Express the given statement (1) in words.
- Express the **negation** of the given statement (1) in symbols. (**Do NOT use the symbol**  $\notin$ .)
- Express the **negation** of the given statement (1) in words.

3. Negate the following statements:

- There is a politician who is honest or trustworthy.
- The number  $p$  is prime or the number  $q$  is not prime.

4. Given a quantified statement

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

- Express the statement (2) in words.
- Express the **negation** of the statement (2) in symbols. (**Do NOT use the symbol**  $\notin$ .)

5. Consider the following statement:

“If  $x$  is a real positive number, then there is a real positive number  $\varepsilon$  such that  $x < \varepsilon$  but  $\frac{1}{\varepsilon} < x$ .”

- Express the given statement in symbols. (**Do not use** “ $\Rightarrow$ ”)
- Express the **negation** of the given statement in symbols in a useful form .
- Express the **negation** of the given statement in words.

6. Consider the following definition:

A real-valued function  $f(x)$  is said to be **decreasing** on the closed interval  $[a, b]$ , if for all  $x_1, x_2 \in [a, b]$ , if  $x_1 < x_2$ , then  $f(x_1) > f(x_2)$ .

- Write the negation of this definition.
- Give an example of a decreasing function on  $[-1, 1]$ .
- Give an example of a function that is not decreasing on  $[-1, 1]$ .