

1. (5 points each) Compute the following:

a)  $\lfloor 5.7 \rfloor =$

b)  $\lfloor \pi \rfloor =$

c)  $\lceil 11.35 \rceil =$

d)  $\prod_{k=-3}^2 k =$

f)  $5! =$

g)  $\sum_{i=3}^6 (i-5)^2 =$

h)  $\sum_{i=100}^{200} i =$

i)  $\frac{200!}{197!13!} =$

2. (10 points) True or False? If true, prove it. If false, provide a counter-example.

$$\lfloor x^2 \rfloor = \lfloor x \rfloor^2$$

3. (5 points each) Let  $U = \{1, 2, 3, \dots, 9, 10\}$ ,  $A = \{2, 4, 6, 8, 10\}$  and  $B = \{3, 6, 9\}$ .

a) Compute  $A \oplus B$ .

b) Compute  $\overline{A} \cap \overline{B}$ .

c) Compute  $\overline{A \oplus B}$ .

4. (5 points) Let  $A$  be an infinite countable set. By definition  $|A| =$  (symbol) and is named .

5. (5 points each) Why is  $f$  not a function from  $\mathbb{R} \rightarrow \mathbb{R}$  if

a)  $f(x) = \frac{1}{x}$ ?

b)  $f(x) = \sqrt{x}$ ?

c)  $f(x) = \pm \sqrt{x^2 + 1}$ ?

6. (5 points) Let  $A$  and  $B$  be sets. Describe the strategy for proving  $A = B$ .

7. (10 points) Let  $A$  and  $B$  be sets. Prove  $\overline{A \cap B} = \overline{A} \cup \overline{B}$ .

8. (10 points) Let  $A$  and  $B$  be sets. Prove  $A \oplus B = (A - B) \cup (B - A)$