

## Quiz III (CS 205 - Fall 2019)

Name:

NetID:

Section No.:

For each of the following problems, use the space provided below the problem statement to write down your answer. Write clearly and concisely. There are 3 problems in total.

1. (10 pts) Consider the following statement

$$\text{If } X \subseteq Y \text{ then } \bar{Y} \subseteq \bar{X}.$$

Below is an incomplete proof of the statement. Complete the proof.

**Proof:** Assume that  $X \subseteq Y$ . Recall that in order to show that  $\bar{Y} \subseteq \bar{X}$  we need to prove that

$$a \in \bar{Y} \rightarrow a \in \bar{X}.$$

Let  $a$  be an arbitrary element of the universe such that  $a \in \bar{Y}$ . This is equivalent to the statement

$$a \notin Y.$$

(Now use the fact that  $a \notin Y$  and  $X \subseteq Y$  to show that  $a \in \bar{X}$ . This would complete the proof)

2. (10 + 10 = 20 pts) For each of the following statements, state whether you think the statement is True or False and provide an explanation for your answer.

- (a) Let  $A = \{a, b, c, d, e\}$  and  $B = \{1, 2, 3, 4\}$ . Then it is possible to define a function  $f : A \rightarrow B$  such that  $f$  is an injective function.

(b) Let  $A = \text{pow}(\emptyset)$  then  $\emptyset \subseteq A$  and  $\emptyset \in A$ .

3. (**20 pts**) There are 131 students in CS 205: 100 like chocolate ice cream, 50 like vanilla ice cream, and 20 like both chocolate and vanilla ice-cream. How many student are there in CS 205 that like neither chocolate ice cream nor vanilla ice cream?