

CSE 311: Foundations of Computing I

Section 1: Propositional Logic, Translation

1. English to Logic Translation

Translate the English sentences below into propositional logic.

- (a) Whenever I walk my dog, I make new friends.
- (b) I will drink coffee, if Starbucks is open or my coffeemaker works.
- (c) Being a U.S. citizen and over 18 is sufficient to be eligible to vote.
- (d) I can go home only if I have finished my homework.
- (e) Having an internet connection is necessary to log onto zoom.
- (f) I am a student because I attend university.

2. Logic to English Translation

Given propositions and a logical formula, write **two** potential English translations.

- (a) p : The sun is out
 q : We have class outside

$$p \rightarrow q$$

- (b) p : the book has been out for a week.
 q : I don't have homework.
 r : I have finished reading the book.

$$(p \wedge q) \rightarrow r$$

- (c) p : I have read the manual
 q : I operate the machine

$$q \rightarrow p$$

3. Trickier Translation

For each of the following, define propositional variables and translate the sentences into logical notation.

- (a) I will remember to send you the address only if you send me an e-mail message.
- (b) If berries are ripe along the trail, hiking is safe if and only if grizzly bears have not been seen in the area.
- (c) Unless I am trying to type something, my cat is either eating or sleeping.

4. Truth Table

Consider the following sentence:

If I am drinking tea then I am eating a cookie, or, if I am eating a cookie then I am drinking tea.

- (a) Define propositional variables and translate the sentence into an expression in logical notation.
- (b) Fill out a truth table for your expression.

5. OR vs. XOR

Exclusive or (\oplus) and inclusive or (\vee) both can be translated as “or” in English. For each of the following ambiguous phrases, decide which type of “or” is likely meant and why.

- (a) Experience with C or Java is required.
- (b) Lunch includes soup or salad.
- (c) To enter the country, you need a passport or voter registration card.