CSE 311: Foundations of Computing I

Section 1: Logic

0. Exclusive Or
For each of the following, decide whether inclusive-or or exclusive-or is intended:

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

1. Translations
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.

2. Teatime
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.
(c) Based on your truth table, classify the original sentence as a contingency, tautology, or contradiction.
3. Truth Tables
Write a truth table for each of the following:

(a) \((p \oplus q) \lor (p \oplus \neg q)\)

(b) \((p \lor q) \to (p \oplus q)\)

(c) \(p \leftrightarrow \neg p\)

4. Circuitous
Translate the following circuit into a logical expression.