CSE 2321 Foundations I Spring 2024 Dr. Estill

Homework 1 Due: Friday, January 26

1.) (5 pts each) Mark whether each of the following is a proposition or not. Don't worry about whether they're true or false.

(a) $\int \sin(x)dx = -\cos(x)$

(b) C is a typed language.

(c) Pancakes are not a breakfast food.

(d) $5 + 3 = 4$

(e) The flower, being tannic, is simply far too egress to clang.[1]

(f) Lisp is the best language for programming games.

(g) Mozambique is a country in central Asia.

(h) lhkize fzueyuu rgfjfjfjfjfj woo

2.) (25 pts) Let $\oplus$ denote the exclusive or, XOR, operation, defined by the following truth table.

P	Q	$P \oplus Q$
0	0	0
0	1	1
1	0	1
1	1	0

Construct a Boolean expression equivalent to $P \oplus Q$ using only the connectives (functions) $\wedge$, $\vee$, and $\neg$.

3.) (5 pts each) Let P be the proposition "The semi-finals are on Saturday."
Let Q be the proposition "Walter will bowl in the semi-finals."
Let R be the proposition "Walter's team wins the quarter-finals."

Using logical connectives, write a Boolean expression that symbolizes each of the following (continues on next page):

(a) If the semi-finals are not on Saturday and his team wins the quarter-finals, then Walter will bowl in the semi-finals.

(b) Walter will bowl in the semi-finals only if his team wins the quarter-finals.

(c) The semi-finals are on Saturday but Walter won't bowl in them.

[1] Hint for non-native speakers of English: This is nonsense.

(d) Either Walter's team wins the quarter-finals, or the semi-finals are on Saturday and Walter won't bowl in them (but not both, *that is to say that the 'or' is exclusive.*)

Translate the following Boolean expressions into English using the same meanings from above. You don't have to worry about grammar.

(e) $P \vee Q$

(f) $Q \Rightarrow P$

(g) $\neg P \wedge \neg Q$