CS 2102 - DMT1 - Fall 2019 — Luther Tychonievich
Practice exercise in class friday september 6, 2019

Practice 01

problem 1 *English to logic*

Rewrite each of the following English sentences as an expression over propositions. Include both a mapping from symbols to propositions and the final expression (see the example). If there are ambiguities, explain where they arise, and give two non-equivalent interpretations.

1. (example) If I forget my keys I can't get into the house unless my roommate is home.

   K: I remember my keys

   H: I can enter my house

   R: My roommate is home

   $\neg K \wedge \neg R \rightarrow \neg H$

2. I prefer oranges to apples, although apples are less messy to eat

3. If you can prove $P \neq NP$ (or $P = NP$, though I hope you don't), you'll become famous and I'll give you an A in this class

4. Python programmers must be lazy because Python programs are so much shorter than the equivalent Java or C++ programs

PROBLEM 2 *If Statements*

Write an expression for when the following function returns the given return values. Use the variables `a` and `b` as your propositions.

```
def f(a,b):
    if a:
        return "left"
    elif b:
        return "right"
    else:
        return "up"
```

```
public static String f(boolean a, boolean b){
    if(a)
        return "left";
    else if(b)
        return "right";
    else
        return "up";
}
```

Returns *"right"* when

Returns *"up"* when

PROBLEM 3 *Truth Tables*

Fill in the following truth tables

A	B	C	$(A \vee C) \leftrightarrow (B \wedge C)$
0	0	0	
0	0	1	
0	1	0	
0	1	1	
1	0	0	
1	0	1	
1	1	0	
1	1	1	

A	B	C	$(A \oplus B) \vee (A \oplus C) \vee (B \oplus C)$
0	0	0	
0	0	1	
0	1	0	
0	1	1	
1	0	0	
1	0	1	
1	1	0	
1	1	1	

In each of the blanks below, put 1^{st} if the first truth table above is the given idea; 2^{nd} if the second truth table is; leave it blank if neither is.

____ at least one of A, B, and C is 1

____ at least one of A, B, and C is 0

____ A, B, and C are all the same

____ A, B, and C are not all the same

____ either A and C are both false or B and C are both true, but not both

____ either A and C are both false or B and C are both true, or both