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CS 2102 - DMT1 - FALL 2019 — LUTHER TYCHONIEVICH
ADMINISTERED IN CLASS FRIDAY SEPTEMBER 6, 2019

QUIZ 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. If there are ambiguities, explain where they arise, and give two non-equivalent interpretations.

1. Excessive bail shall not be required, nor excessive fines imposed, nor cruel and unusual punishments inflicted
2. Jim Ryan will have to give up being the president of UVA if Teresa Sullivan returns to UVA
3. Because we know that no general-purpose sorting algorithm can be faster than $O(n \log n)$, if you hear about any faster algorithm you can know it must be “cheating” somehow

PROBLEM 2 *If Statements*

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

```
def f(a,b,c):
    if a or b:
        return "one"
    elif c != a:
        return "two"
    else:
        return "three"
```

Returns "one" when

```
public static String f(boolean a, boolean b, boolean c){
    if(a || b)
        return "one";
    else if(c != a)
        return "two";
    else
        return "three";
}
```

Returns "three" when

PROBLEM 3 *Truth Tables*

Fill in the following truth table (the dashed lines are just to help you line things up)

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

0	1	0			
0	1	1			

1	0	0			
1	0	1			

1	1	0			
1	1	1			