Name: ____________________ CompID: ____________________

CS 2102 - DMT1 - Spring 2020 — Luther Tychonievich
Administered in class friday february 7, 2020

Quiz 03

problem 1 *Symbolizing*

For each of the following, convert from text to symbolic logic. The first one is done for you.

No G are F. All H are G. So: No H are F

$\nexists x \,.\, G(x) \wedge F(x)$

$\forall x \,.\, H(x) \rightarrow G(x)$

$\therefore \quad \nexists x \,.\, H(x) \wedge F(x)$

1. Something is F. Nothing is G. So: Something is not G

2. Some P is Q. All Q are R. So: Some P is R

3. All P are Q. No Q are P. So: Nothing is P

PROBLEM 2 *Symbolizing with a Key*

Using this symbolization key:

domain: all animals

$A(x)$: $\_\_\_\__x$ is an alligator

$M(x)$: $\_\_\_\__x$ is a monkey

$Z(x)$: $\_\_\_\__x$ lives at the zoo

$L(x, y)$: $\_\_\_\__x$ loves $\_\_\_\__y$

f: Fluffy

s: Slick

h: Howler

Symbolize each of the following sentences; the first one is done for you.

If both Slick and Howler are alligators, then Fluffy loves them both.

$$\big(A(s) \land A(h)\big) \to \big(L(f, s) \land L(f, h)\big)$$

4. No monkey is an alligator.

5. Slick loves every alligator that loves Howler.

6. Every animal in the zoo has an animal they love that loves them back.

You have enough to worry about memorizing without keeping dozens of symbols in your head at once. We intend to provide this table for your reference during every in-class evaluation.

Concept	Java/C	Python	This class	Bitwise	Other
true	`true`	`True`	$\top$ or 1	`-1`	T, tautology
false	`false`	`False`	$\bot$ or 0	`0`	F, contradiction
not P	`!p`	`not p`	$\neg P$ or $\overline{P}$	`~p`	
P and Q	`p && q`	`p and q`	$P \wedge Q$	`p & q`	PQ, $P \cdot Q$
P or Q	`p || q`	`p or q`	$P \vee Q$	`p | q`	$P + Q$
P xor Q	`p != q`	`p != q`	$P \oplus Q$	`p ^ q`	$P \veebar Q$
P implies Q			$P \rightarrow Q$		$P \supset Q$, $P \Rightarrow Q$
P iff Q	`p == q`	`p == q`	$P \leftrightarrow Q$		$P \Leftrightarrow Q$, P xnor Q

Concept	Symbol	Meaning
equivalent	$\equiv$	"$A \equiv B$" means "$A \leftrightarrow B$ is a tautology"
entails	$\models$	"$A \models B$" means "$A \rightarrow B$ is a tautology"
provable	$\vdash$	"$A \vdash B$" means "A proves B"; it means both "$A \models B$" and "I know B is true because A is true"
		"$\vdash B$" (i.e., without A) means "I know B is true"
therefore	$\therefore$	"$\therefore A$" means both "the lines above this $\vdash A$"
		"$\therefore A$" also connotes "A is the thing we wanted to show"