

Math 155A - Fall 2021 - Quiz #1 - Hand in by 9:30am, October 1.

Start Time:

Your name: *Answer Key*

Stop Time:

Integrity signature:

Time limit 15 minutes. Please add explanation below if over 17 minutes total.

1. Use the variables

f - "The coffee pot falls"

b - "The coffee pot breaks"

g - "The coffee pot is made of glass"

t - "The coffee pot is made of titanium"

should be "∧"

and propositional connectives $\neg, \vee, \ominus, \rightarrow, \leftrightarrow$ to express the sentences (a)-(g) as propositional formulas. When necessary, use parentheses to clarify the meaning of the propositional formulas. (You do not need include all the parentheses required in the formal definition of formulas.)

Other answers are possible!

(a) The coffee breaks only if it is made of glass. $b \rightarrow f$

(b) The coffee breaks if it is made of glass and it falls. $(g \wedge f) \rightarrow b$

(c) The coffee pot is made of titanium or glass but not both. $(g \vee b) \wedge (\neg g \vee \neg b)$

(d) The coffee pot falls if and only if it is made of glass. $f \leftrightarrow g$

(e) The coffee pot falls but does not break. $f \wedge \neg b$

(f) The coffee does not break unless it is made of glass. $b \rightarrow g$

(g) The coffee pot falls, but it does not break unless it is made of glass.

$f \wedge (b \rightarrow g)$ *should be "∧".*

2. Using the same variables and **only** the connectives Δ and \leftrightarrow , express the English sentence "The coffee pot is made of titanium or glass but not both" as a propositional formula. (It is possible you already gave this answer in part (c) above; if so, just reuse that answer.)

$t \leftrightarrow \neg g$ or $\neg (t \leftrightarrow g)$
 or $\neg t \rightarrow g$