MATH 170: HOMEWORK 3

DUE: SEPTEMBER 27, 2021

Graded for accuracy: 2, 3.
Graded for completion: 1.
Instructions: Problems that are graded for accuracy must be correct to get points. Problems that are graded for completion must show some trying effort.

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1. A practice in inductive logic.
   a. Give an argument that supports the statement "Having a pet is good".
   b. Give an argument that supports the statement "Having a pet is bad".
   c. Which of your arguments do you find stronger than another?
   d. Is the statement from part (a) a *mathematical statement*? Why / why not?

2. For each of the following plain English statements, translate it into a symbolic logic propositional formula. Propositional variables in your formulae should represent the simplest propositions that they can.
   (Note that each statement doesn't need to be true. Your job is just to translate to symbolic logic.)
   a. Guinea pigs are quiet, but they are loud when they are hungry.
   b. $\sqrt{2}$ can't be an integer because it is a rational number.

3. For fixed $n \in \mathbb{N}$, let P represent the proposition 'n is even', Q represent the proposition 'n is prime' and R represent the proposition '$n = 2$'. For each of the following propositional formulae, translate it into plain English and determine whether it is true for all $n \in \mathbb{N}$, true for some values of n and false for some values of n, or false for all $n \in \mathbb{N}$.
   a. $(P \wedge Q) \implies R$
   b. $Q \wedge (\neg R) \implies (\neg P)$
   c. $((\neg P) \vee (\neg Q)) \vee (\neg R)$

d. $(Q \wedge P) \vee (\neg R)$