4511W, Fall-2017
ASSIGNMENT 4:
Assigned: 11/04/17 Due: Sunday 11/12/17 at 11:55 PM Submit on moodle (in a zip if you have multiple files)

Written/drawn:

Problem 1. (40 points)
Find a substitution for letters to digits that makes the below mathematically true using backtracking search (You do not need to be smart about picking values for the variable you are searching). Each letter is a unique digit (i.e. "E" and "N" cannot be the same digit) and leading digits cannot be zero. Show your work.

```
        S   E   N   D
   +    M   O   R   E
=   M   O   N   E   Y
```

Problem 2. (20 points)
Consider the following sentences:

$$A \wedge (B \vee C) \wedge (C \Rightarrow B)$$

(1) ~~What is the model of these sentences?~~ What are the models for the sentence above?

$$B$$

(2) ~~What is the model of the sentence: B?~~ What are the models for the sentence above?
(3) Show whether or not "Sentence from (1) entails Sentence from (2)".

Problem 3. (20 points)
Consider the following sentences:

$$A$$
$$\neg A \vee B$$
$$C \vee \neg D$$
$$D \vee C$$
$$\neg B \vee \neg D \vee E$$

(1) Use resolution to determine whether these sentences entail C
(2) Use resolution to determine whether these sentences entail E
When answering both of these, show you work step-by-step.

Programming (python):

The relevant code is in:
/root/logic.py
/root/tests/test_logic.py

Problem 4. (20 points)
(1) Write problem 3 into a knowledge base. Show the code you did to accomplish this.

(2) Use the knowledge base from (4.1) to find the answers to (3.1) and (3.2). Show the code and output.