Assignment 4

Problems

1. More weird numbers

"Take a four-digit number. Add the number formed by the first two digits to the number formed by the last two digits, and square the resulting sum. Surprise! You've got the original number back."

Write a program to find all the four-digit numbers that have this property.

For example, here's a number that fails the test: 1430. Add 14 to 30 to get 44, square 44 to get 1936, but this is not what we started with (i.e. 1430) so this number fails the test.

2. Drawing Diamonds

Write a program that displays a diamond on the screen, e.g.

```
  *
 ***
*****
 ***
  *
```

Your program should ask the user how large a diamond to draw and what character to use to draw it. (The size of a diamond is specified by the lengths of its sides, i.e. 3 in the case above).

3. DONALD + GERALD = ROBERT

Write a program that displays the solution(s) to the cryptarithm:

```
  DONALD
+ GERALD
--------
  ROBERT
```

Each letter represents one digit. No two letters represent the same digit. The numbers represented by DONALD, GERALD and ROBERT are well-formed, e.g. do not begin with 0. How fast can you make your program? The faster the better (you can't presolve it and just the print the solution, that is definitely a cheat!).

Include timing code in your program so I can compare its speed to others on my computer.

4. Craps

Write a program that outputs the probability of winning at the game of craps. The rules for the game of craps are:

> *A player rolls two dice. Each die has six faces. These faces contain the numbers 1 to 6. After the dice have come to rest, the sum of the spots on the two upward faces is calculated. If the sum is 7 or 11 on the first throw, the player wins. If the sum is 2, 3 or 12 on the first throw (called "craps"), the player loses (i.e. the "house" wins). If the sum is 4, 5, 6, 8, 9 or 10 on the first throw, then that sum becomes the player's "point". To win, you must continue rolling the dice until you "make your point" (i.e. roll the same sum again). The player loses by rolling a 7 before making the point.*

Logistics

- Use the following naming scheme for your program files: `a`*assignment#*`p`*problem#*`.py`. So, your solution for problem 1 on this assignment will be named `a4p1.py`.
- Submit your assignment through the Moodle page. There will be a Dropbox for the assignment for you to upload your .py files.