Exercise: Rolling Two Fair Dice

(5/5 points)

In this exercise, we look at how to set up a probabilistic model for rolling two fair six-sided dice with faces 1 through 6. We shall define our sample space Ω such that an outcome $(1, 4)$ means that the first roll was a 1 and the second was a 4, outcome $(3, 5)$ means that the first roll was a 3 and the second was a 5, etc.

- Given how we have set up the sample space, how many possible outcomes are there?

  36 ✔ **Answer:** 36

- Because the dice are fair, the possible outcomes are all equally likely. What is the probability of each outcome?

  1/36 ✔ **Answer:** 1/36

- For this problem, writing out all the possible outcomes by hand is quite tedious. In Python, we can quickly code up the full probabilistic model. The code below does so, except that it's incomplete!

```
model = {}
for i in range(1, x+1):
    for j in range(1, y+1):
        model[(i, j)] = z
```

What numerical constants should `x`, `y`, and `z` be set to so that after the above code is run, `model` stores the probabilistic model for the two fair dice rolls?

x = 6 ✔ **Answer:** 6

y = 6 ✔ **Answer:** 6

z = 1./36 ✔ **Answer:** 1/36

Solution:

- Given how we have set up the sample space, how many possible outcomes are there?

  There are 6 possible outcomes for the first die, and 6 for the second, so the number of possible outcomes is 6 x 6 = **36**. We can even list them out although it's quite tedious: (1,1), (1,2), (1,3), (1,4), (1,5), (1,6), (2,1), (2,2), (2,3), (2,4), (2,5), (2,6), (3,1), (3,2), (3,3), (3,4), (3,5), (3,6), (4,1), (4,2), (4,3), (4,4), (4,5), (4,6), (5,1), (5,2), (5,3), (5,4), (5,5), (5,6), (6,1), (6,2), (6,3), (6,4), (6,5), (6,6).

- Because the dice are fair, the possible outcomes are all equally likely. What is the probability of each outcome?

  There are 36 outcomes. Each are equally likely so the probability of each is **1/36**.

- For this problem, writing out all the possible outcomes by hand is quite tedious. In Python, we can quickly code up the full probabilistic model. The code below does so, except that it's incomplete!

```
model = {}
for i in range(1, x+1):
    for j in range(1, y+1):
        model[(i, j)] = z
```

What numerical constants should `x`, `y`, and `z` be set to so that after the above code is run, `model` stores the probabilistic model for the two fair dice rolls?

`x` = **6**

`y` = **6**

`z` = **1/36**

Basically `x` and `y` are the largest faces on the first and second dice, respectively (remember that in Python we need to add 1 to the range; range(1, 7) gives 1, 2, 3, 4, 5, 6).

`z` is the probability assigned to each outcome.

You have used 1 of 5 submissions