Exercise: Some Dice Rolling and Coin Flipping Events

(3/3 points)

- Consider rolling two six-sided dice with faces numbered 1 through 6. Again, we use the sample space from earlier $\Omega = \{(1,1),(1,2),\dots,(6,5),(6,6)\}$. What is the event that the sum of the faces is 7? Enter your answer as a Python set.

  set([(1,6),(6,1),(2,5),(5,2) ✔ **Answer:** {(1,6),(6,1),(2,5),(5,2),(3,4),(4,3)}

- We flip a coin. The coin landing with any face shown means that it's okay if either heads shows or tails shows. This corresponds to the event $\mathcal{A}_{\text{any-face-shows}} = \{\text{heads}, \text{tails}\}$, which happens to be equal to the whole sample space. Meanwhile, simultaneously having both heads and tails show face up refers to an impossible situation, corresponding to the “empty set" event $\mathcal{A}_{\text{both-faces-simultaneously-show}} = \{\}$, also denoted as $\emptyset$.

  Compute the probabilities of the following events:

  $\mathbb{P}(\mathcal{A}_{\text{any-face-shows}}) =$ 1 ✔ **Answer:** 1

  $\mathbb{P}(\mathcal{A}_{\text{both-faces-simultaneously-show}}) =$ 0 ✔ **Answer:** 0

Solution:

- Consider rolling two six-sided dice with faces numbered 1 through 6. Again, we use the sample space from earlier $\Omega = \{(1,1),(1,2),\ldots,(6,5),(6,6)\}$. What is the event that the sum of the faces is 7? Enter your answer as a Python set.

  This is just a matter of exhaustively listing out all the outcomes in which the two dice's faces add to 7: **{(1,6),(6,1),(2,5),(5,2),(3,4),(4,3)}**

  One way to automate coming up with the solution is to code something that outputs the above set:

  ```
  faces_that_add_to_7 = set()
  for x in range(1, 7):
      for y in range(1, 7):
          if x + y == 7:
              faces_that_add_to_7.add((x, y))
  ```

  Then you could print out `faces_that_add_to_7` and copy and paste it to the answer box.

- Since $\mathcal{A}_{\text{any-face-shows}} = \{\text{heads}, \text{tails}\}$, we have

  $$\mathbb{P}(\mathcal{A}_{\text{any-face-shows}}) = \mathbb{P}(\text{heads}) + \mathbb{P}(\text{tails}) = \frac{1}{2} + \frac{1}{2} = 1.$$

  Next, since $\mathcal{A}_{\text{both-faces-simultaneously-show}} = \{\}$ is empty, there's nothing to add up, so

$$\mathbb{P}(\mathcal{A}_{\text{both-faces-simultaneously-show}}) = 0.$$

You have used 1 of 5 submissions