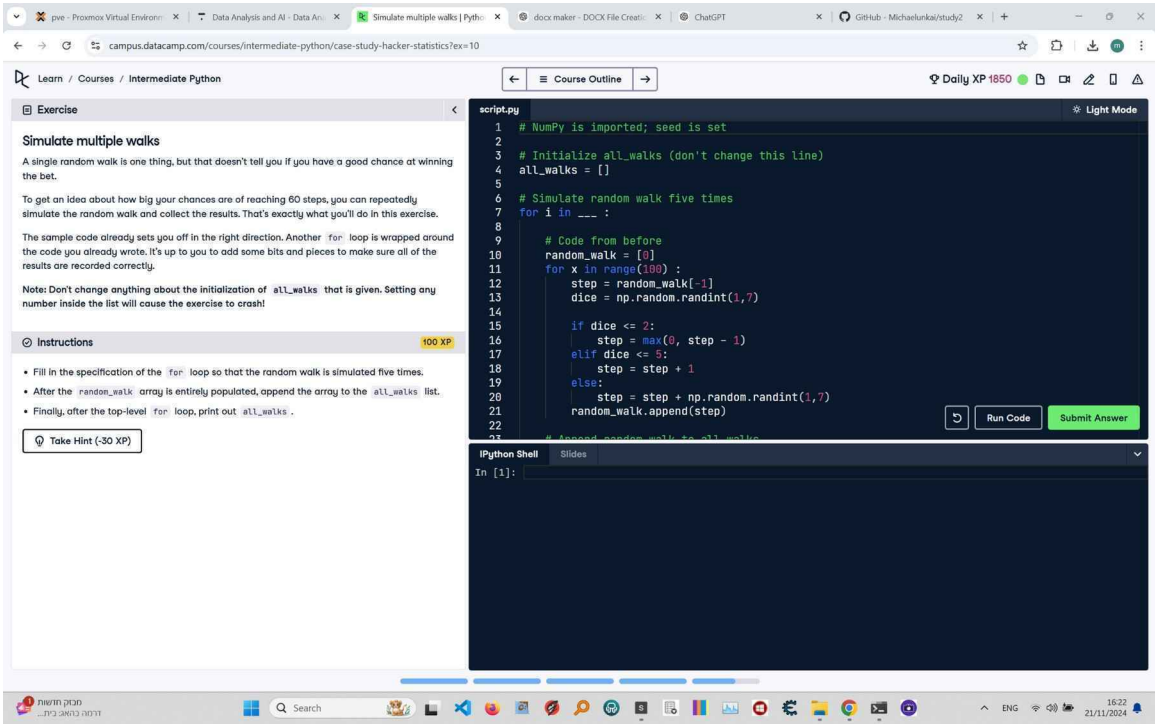
Simulate Multiple Walks



Below is the exercise on 'Simulate Multiple Walks' from the Python course. The image includes the instructions, code, and task details.

Solution:

```
# NumPy is imported; seed is set
import numpy as np
np.random.seed(123)

# Initialize all_walks (don't change this line)
all_walks = []

# Simulate random walk five times
for i in range(5):  # Loop runs 5 times
    # Code from before
    random_walk = [0]
    for x in range(100):  # Loop runs 100 times for each walk
        # Set step: last element in random_walk
        step = random_walk[-1]

        # Roll the dice
```

```
        dice = np.random.randint(1, 7)

        # Determine next step using max to prevent step from going below 0
        if dice <= 2:
            step = max(0, step - 1)  # Move down but ensure step doesn't go
below 0
        elif dice <= 5:
            step = step + 1  # Move up
        else:
            step = step + np.random.randint(1, 7)  # Move up by a random value

        # Append next_step to random_walk
        random_walk.append(step)

    # Append random_walk to all_walks
    all_walks.append(random_walk)

# Print all_walks
print(all_walks)
```

Explanation:

1. Import numpy as np and set the random seed using np.random.seed(123) to ensure reproducibility.

2. Initialize all_walks as an empty list to store the results of multiple random walks.

3. Use a for loop to repeat the random walk simulation 5 times:

   - For each walk, initialize random_walk as a list containing the first step, 0.

   - Use a nested for loop that runs 100 times to simulate the steps of each random walk:

     - Get the current step as the last element of the random_walk list using random_walk[-1].

     - Roll the dice using np.random.randint(1, 7) to generate a random integer between 1 and 6.

     - Use max() to ensure that step doesn't go below 0 when dice <= 2. This prevents negative steps:

       - If dice is 1 or 2, use max(0, step - 1) to decrease step by 1 but not below 0.

- If dice is 3, 4, or 5, increase step by 1.
- If dice is 6, roll the dice again and add the new result to step.
- Append the updated step to the random_walk list.
- Append the completed random_walk to the all_walks list.

4. Print all_walks to see the results of the 5 random walks.