Tree Diagrams — Math 111

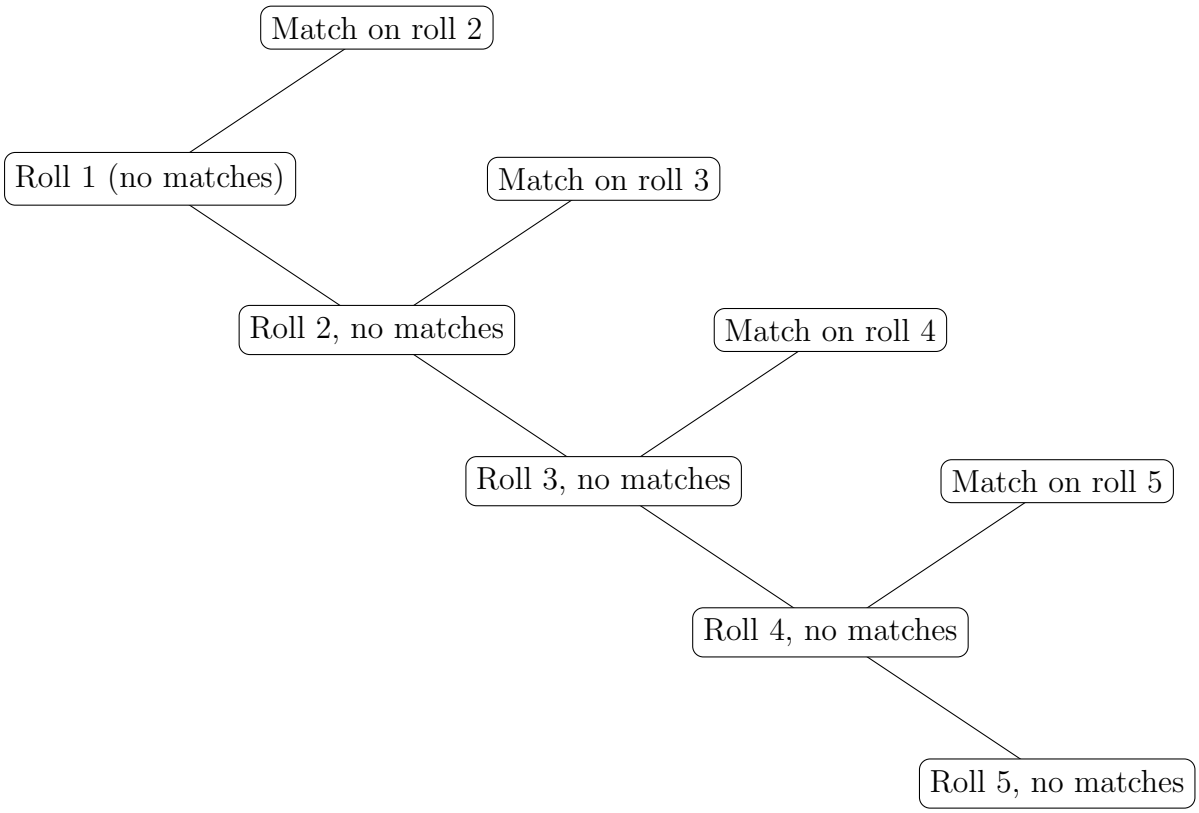
1. An unfair coin lands heads 75% of the time, and tails 25% percent of the time. Draw a weighted tree diagram showing the possible outcomes for flipping the coin twice, and find the final probability for each outcome.

2. A player serving in tennis has two chances to get a serve into play. If the first serve is out, the player serves again. If the second serve is out, the player loses the point. Here are probabilities based on four years of the Wilbledon Championship.

$$P(\text{1st serve in}) = 0.59$$
$$P(\text{win point}|\text{1st serve in}) = 0.73$$
$$P(\text{2nd serve in}|\text{1st serve out}) = 0.86$$
$$P(\text{win point}|\text{1st serve out and 2nd serve in}) = 0.59$$

   Make a tree diagram for the results of the two serves and the outcome (win or lose) of the point. What is the probability that the serving player wins the point?

3. **Yahtzee Pairs** In this problem, our goal is to find the probability that when you roll 5 dice, there is at least one matched pair (two or more dice showing the same number). You can answer the question by completing the following tree diagram.



4. **The Birthday Problem** The birthday problem is this: *what is the probability that in a group of, let's say 30 people, there are two people with the same birthday?* Use the technique from the previous problem to solve the Birthday problem.