

## Probability: To Tree Or Not To Tree...

The following questions can all be solved by means of a tree diagram. However, some of them become very hard to draw. Try to look for shortcuts to your calculations so that you can avoid the tree diagrams. These shortcuts will become useful later in the S1 course.

- A bag contains 4 white and 5 black balls. I pick a ball from the bag.
  - Calculate the probability I pick a black ball. 5/9
  - Calculate the probability I pick a white ball. 4/9
- A bag contains 4 white and 5 black balls. I pick two balls from the bag without replacement.
  - Calculate the probability I pick two balls with the same colour. 4/9
  - Calculate the probability I pick two balls with different colour. 5/9
- A bag contains 4 red, 3 blue and 5 yellow balls. I pick two balls from the bag without replacement.
  - Calculate the probability I pick two balls with the same colour. 19/66
  - Calculate the probability I pick two balls with different colour. 47/66
  - What do your previous two answers sum to and why? 1
- A bag contains 4 red, 3 blue and 5 yellow balls. I pick three balls from the bag without replacement.
  - Calculate the probability I pick three balls with the same colour. 3/44
  - Calculate the probability I pick three balls with different colour. 3/11
  - Calculate the probability I pick two of one colour and one of another. 29/44
  - What do your previous three answers sum to and why? 1
- A bag contains  $r$  red balls,  $b$  blue balls and  $y$  yellow balls where  $r > 3$ ,  $b > 3$  and  $y > 3$ . I pick three balls from the bag without replacement. Calculate the probability I pick two of one colour and one of another.  $\frac{3[r(r-1)(b+y)+y(y-1)(b+r)+b(b-1)(r+y)]}{(r+b+y)(r+b+y-1)(r+b+y-2)}$
- A bag contains 4 yellow, 3 green, 5 black and 5 red balls. Calculate the probability, if I pick three balls at once, that I get two of one colour and one of another. 9/17
- A bag contains 4 yellow, 5 green and 6 red balls. I pick four balls from the bag at once.
  - Calculate the probability they are all different colours :- ) 0
  - Calculate the probability I gain two of one colour and two of another. 40/91
- A bag contains 4 yellow, 5 green, 6 red and 4 blue balls. I pick four balls from the bag at once.
  - Calculate the probability all four balls are different. 40/323
  - Calculate the probability I gain three of one colour and one of another. 130/969
- NOW DO ALL OF THE ABOVE QUESTIONS WITH REPLACEMENT... :-)