Tree Diagrams Workshop

1. About 0.8% of women aged 40-50 have breast cancer. Mammograms are 90% accurate at detecting breast cancer if someone has it. They are also 93% accurate at correctly *not* detecting breast cancer in healthy women.

   (a) Make a weighted tree diagram for this situation.

   (b) What percent of women aged 40-50 who get mammograms will test positive for breast cancer?

   (c) Find the conditional probability that a woman actually has breast cancer if she tests positive.

2. In tennis, the player serving the ball has an advantage if they can get the ball into play, but they only have two chances to do so. If both serves are out, then the serving player automatically loses the point. Here are probabilities that the serving player can get the ball into play and that they win the point based on four years of the Wilbledon Championship.

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

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?