Dr Oliver Mathematics
Worked Examples
Probability 5

From: Edexcel 2021 November Paper 5H (Calculator)

1. In a village, (4)

   - if it rains on one day, the probability that it will rain on the next day is 0.8 and
   - if it does not rain on one day, the probability that it will rain on the next day is 0.6.

   A weather forecaster says, "There is a 70% chance that it will rain in the village on Monday."

   Work out an estimate for the probability that it will rain in the village on Wednesday. You must show all your working.

Solution

Well, we have

- Monday fine (F), Tuesday fine (F), and Wednesday rain (R):

$$\begin{aligned} \mathrm{P}(F, F, R) &= 0.3 \times 0.4 \times 0.6 \\ &= 0.072; \end{aligned}$$

- Monday fine (F), Tuesday rain (R), and Wednesday rain (R):

$$\begin{aligned} \mathrm{P}(F, R, R) &= 0.3 \times 0.6 \times 0.8 \\ &= 0.144; \end{aligned}$$

- Monday rain (R), Tuesday fine (F), and Wednesday rain (R):

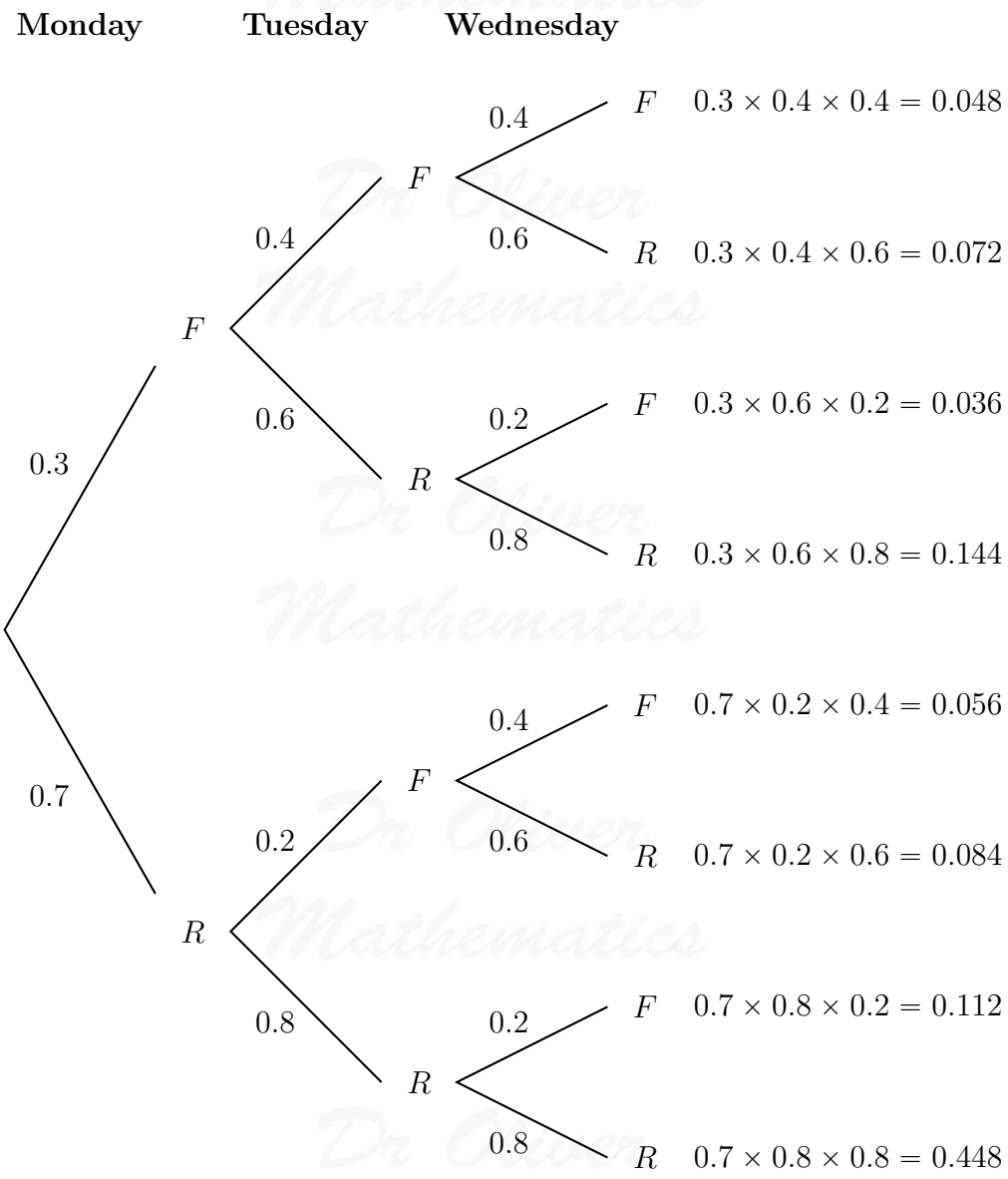
$$\begin{aligned} \mathrm{P}(R, F, R) &= 0.7 \times 0.2 \times 0.6 \\ &= 0.084; \end{aligned}$$

and

- Monday rain (R), Tuesday rain (R), and Wednesday rain (R):

$$\begin{aligned} \mathrm{P}(R, R, R) &= 0.7 \times 0.8 \times 0.8 \\ &= 0.448. \end{aligned}$$

This is the probability tree diagram:



Hence,

$$\begin{aligned} \text{P(rain on Wednesday)} &= 0.072 + 0.144 + 0.084 + 0.448 \\ &= \underline{\underline{0.748}}. \end{aligned}$$