

The expected value in question is

$$\begin{aligned}\mathbf{E}[\text{Time}] &= ((5 + \mathbf{E}[\text{stay of 2nd student}])) \cdot \mathbf{P}(\text{1st stays no more than 5 minutes}) \\ &\quad + ((\mathbf{E}[\text{stay of 1st} \mid \text{stay of 1st} \geq 5] + \mathbf{E}[\text{stay of 2nd}])) \\ &\quad \cdot \mathbf{P}(\text{1st stays more than 5 minutes}).\end{aligned}$$

We have $\mathbf{E}[\text{stay of 2nd student}] = 30$, and, using the memorylessness property of the exponential distribution,

$$\mathbf{E}[\text{stay of 1st} \mid \text{stay of 1st} \geq 5] = 5 + \mathbf{E}[\text{stay of 1st}] = 35.$$

Also

$$\mathbf{P}(\text{1st student stays no more than 5 minutes}) = 1 - e^{-5/30},$$

$$\mathbf{P}(\text{1st student stays more than 5 minutes}) = e^{-5/30}.$$

By substitution we obtain

$$\mathbf{E}[\text{Time}] = (5 + 30) \cdot (1 - e^{-5/30}) + (35 + 30) \cdot e^{-5/30} = 35 + 30 \cdot e^{-5/30} = 60.394.$$