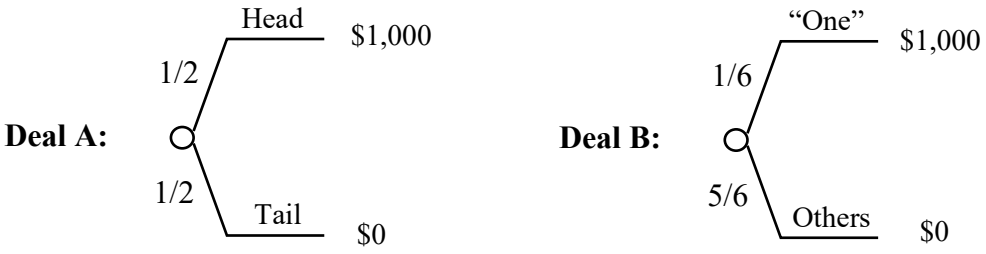
IE5203 Decision Analysis
Solutions to Chapter 3 Exercises

P3.1



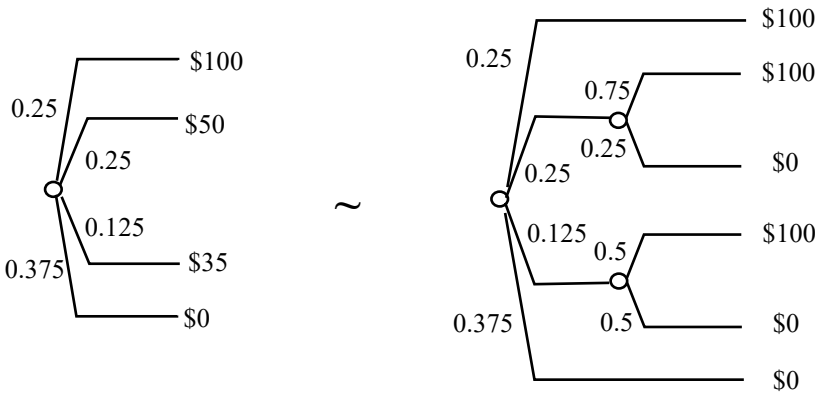
(*a*) I would choose Deal A c/o ***Choice Rule***.

(*b*) The outcomes are bad, but we have made a good decision c/o *good decision vs. good outcomes*.

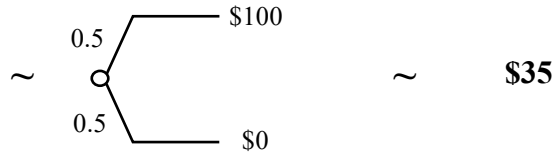
(*c*) Assuming the next roll and flip are independent of the previous roll and flip, I would still choose Deal A.

P3.2

- Using the substitution rule to replace the \$50 and \$35 outcomes with their respective equivalent deals:

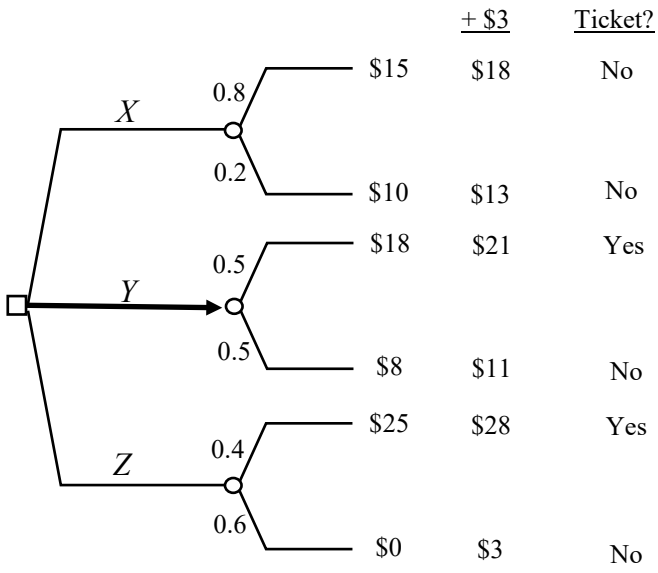


- This can be simplified using the decomposition rule to:



- Hence Certainty Equivalent = \$35.

P3.3



- **Answer**: Since all John cares about is getting a ticket or not, and he prefers getting a ticket to not getting one, he should choose Deal *Y,* which has the highest probability of getting the preferred outcome. This is a direct application of the Choice Rule.

- Alternatively, using the method from Chapter 4: let u(Ticket=yes) = 1 and u(Ticket=no) = 0, and compute the expected utilities of Deals *X*, *Y* and *Z*.

- Note that maximizing the expected dollar value would be wrong because John is only concerned with getting or not getting a ticket.

P3.4

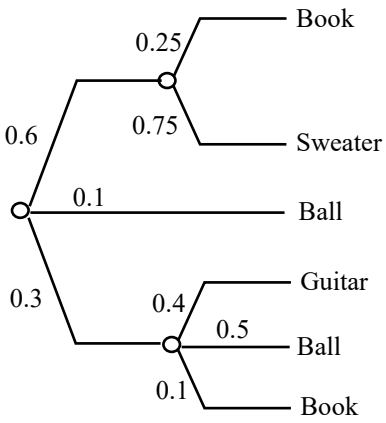
(*a*)

- Given: Guitar $\succ$ Harmonica
- From the 3 relations: Guitar $\succ$ Book $\succ$ Harmonica
  Guitar $\succ$ Sweater $\succ$ Harmonica
  Guitar $\succ$ Ball $\succ$ Harmonica
- By choice rule: Ball (p=0.85) $\succ$ Book ((p=0.7) $\succ$ Sweater ((p=0.2)
- Hence required preference ordering for the 5 individual items is:

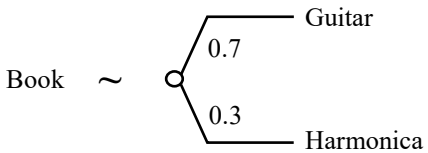
  Guitar $\succ$ Ball $\succ$ Book $\succ$ Sweater $\succ$ Harmonica

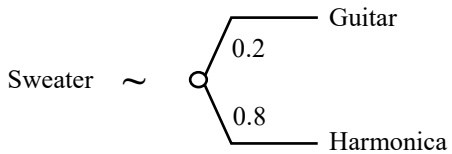
(*b*)

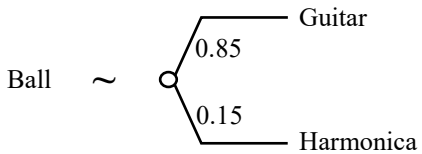
- Given

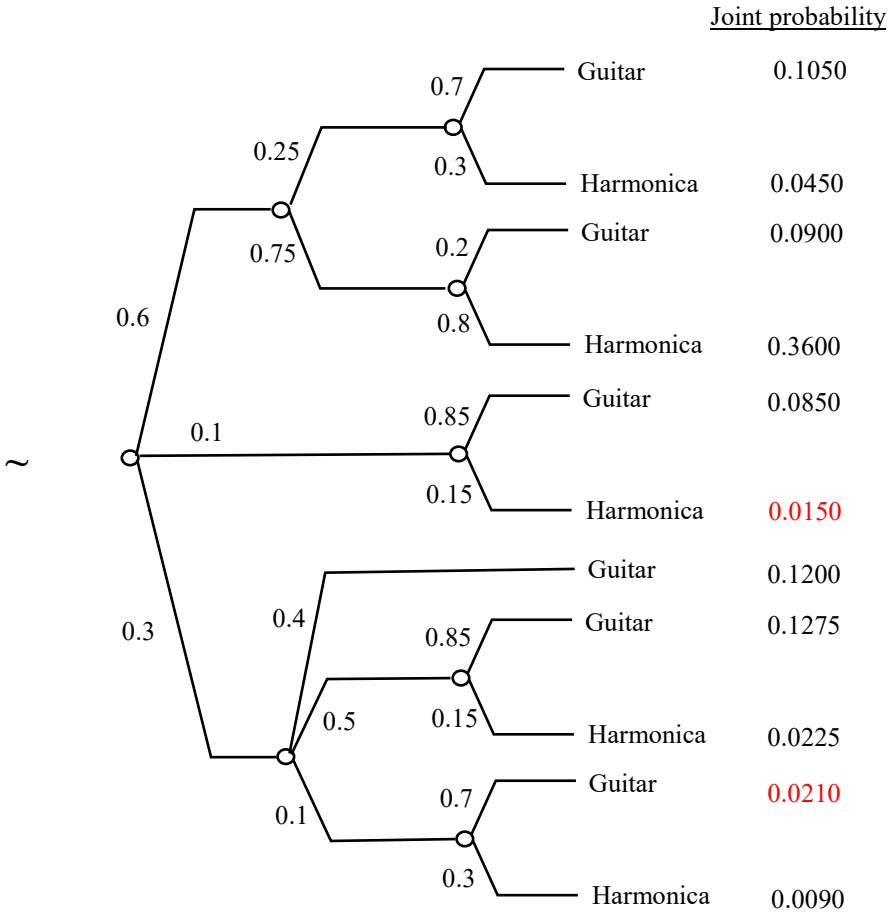


- Substituting the following certainty equivalences into the above:

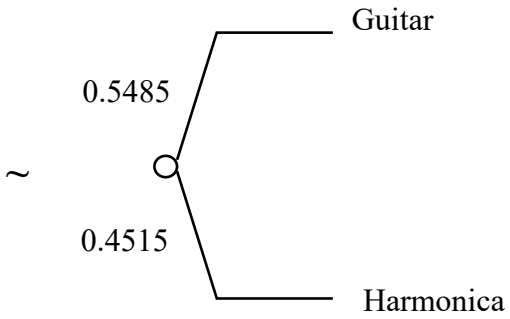








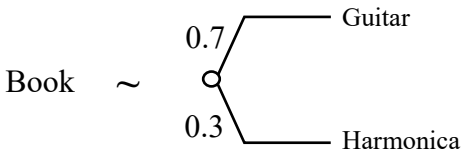
- By Decomposition Rule:



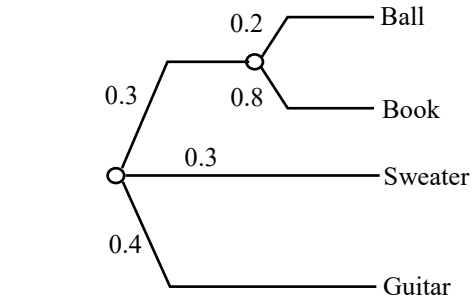
- The required Preference Probability with respect to Guitar-Harmonica Deal = **0.5485**

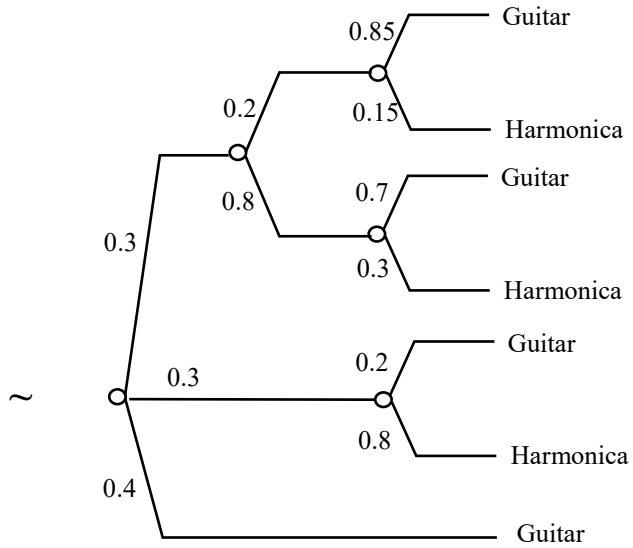
(*c*)

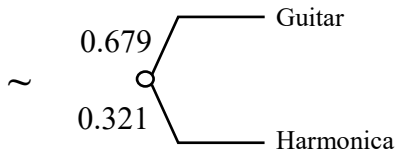
- The Book deal is equivalent to:



- Applying the Substitution and Decomposition rules to the given Deal:







- By the Choice rule, Chris prefers Book to the given Deal since the preference probability for Book = 0.7 > 0.679 = the preference probability for the Deal.

(*d*)

- No, we can't infer anything about Chris's preference for four sweaters vs. one book.

- This is because we do not have enough information about Chris's preference for four sweaters as a bundle. It would be wrong to assume that the preference probability for four sweaters (w.r.t. G-H Deal) is four times that of the preference probability for one sweater (w.r.t. G-H Deal).