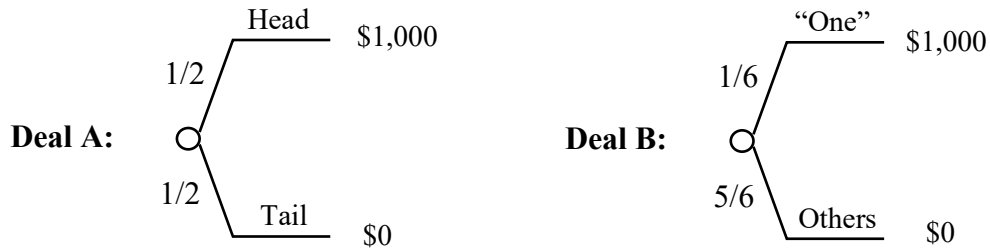


IE5203 Decision Analysis **Solutions to Chapter 3 Exercises**

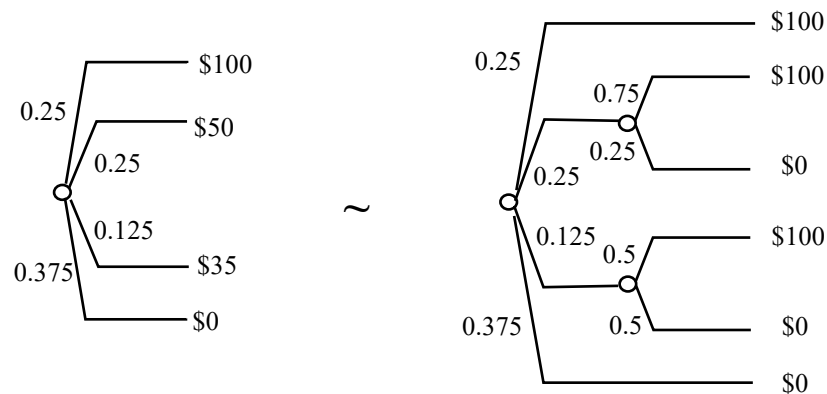
P3.1



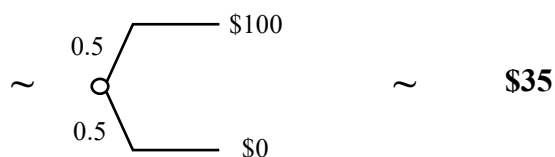
- (a) I would choose Deal A c/o **Choice Rule**.
- (b) The outcomes are bad, but we have made a good decision c/o *good decision vs. good outcomes*.
- (c) Assuming the next roll and flip are independent of the previous roll and flip, I would still choose Deal A.

P3.2

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

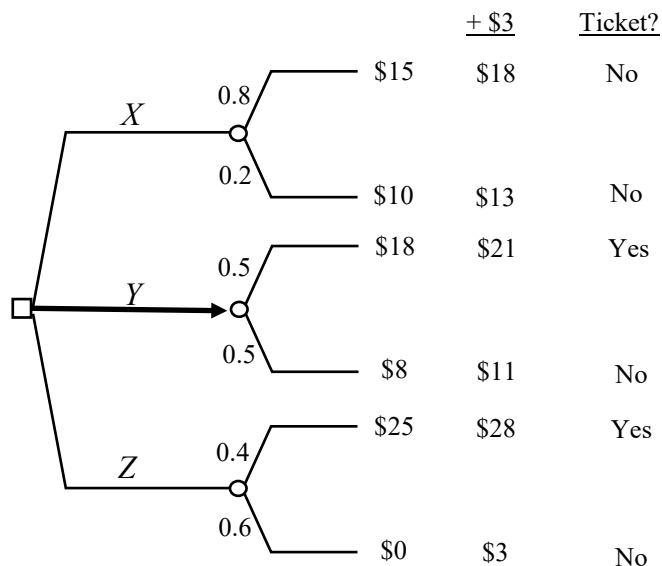


- This can be simplified using the decomposition rule to:



- 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 $u(\text{Ticket=yes}) = 1$ and $u(\text{Ticket=no}) = 0$, 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

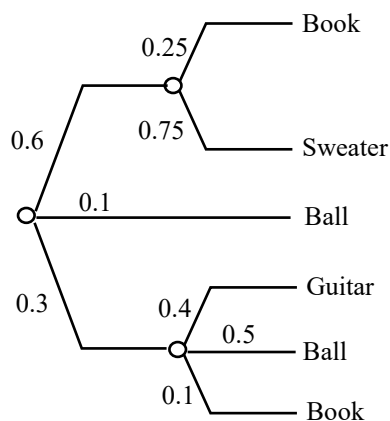
(a)

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

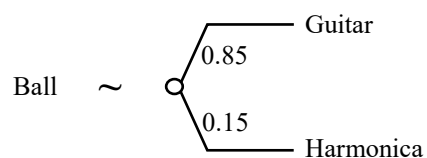
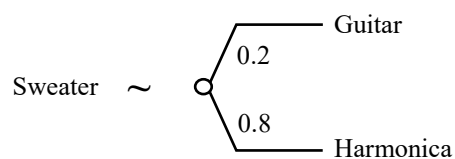
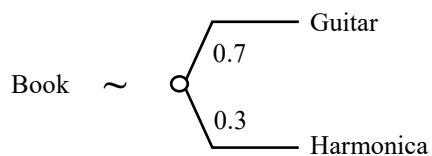
$\text{Guitar} \succ \text{Ball} \succ \text{Book} \succ \text{Sweater} \succ \text{Harmonica}$

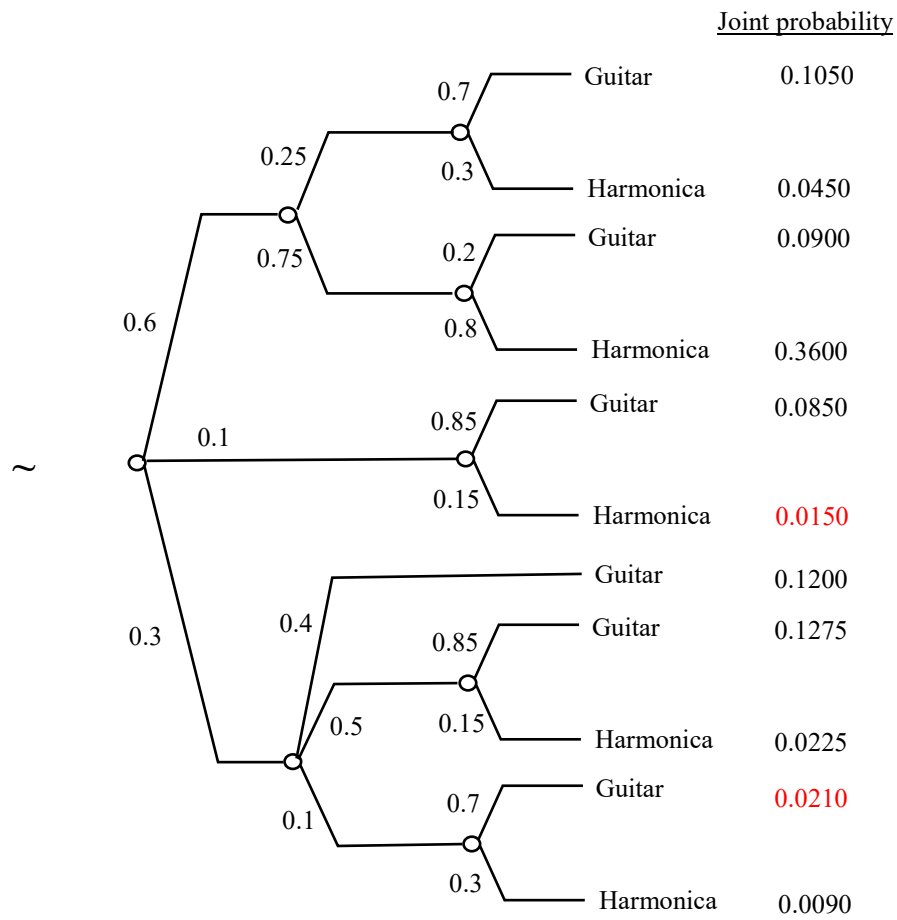
(b)

- Given

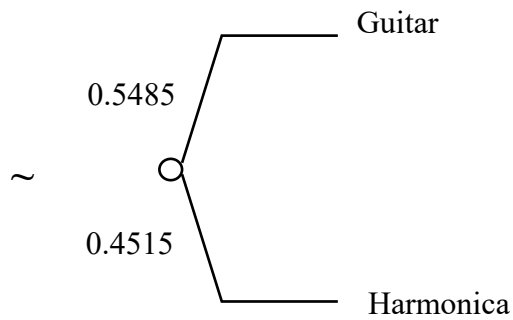


- Substituting the following certainty equivalences into the above:





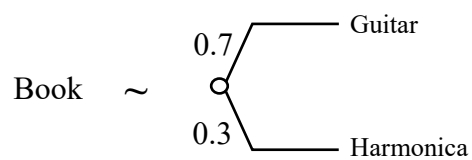
- By Decomposition Rule:



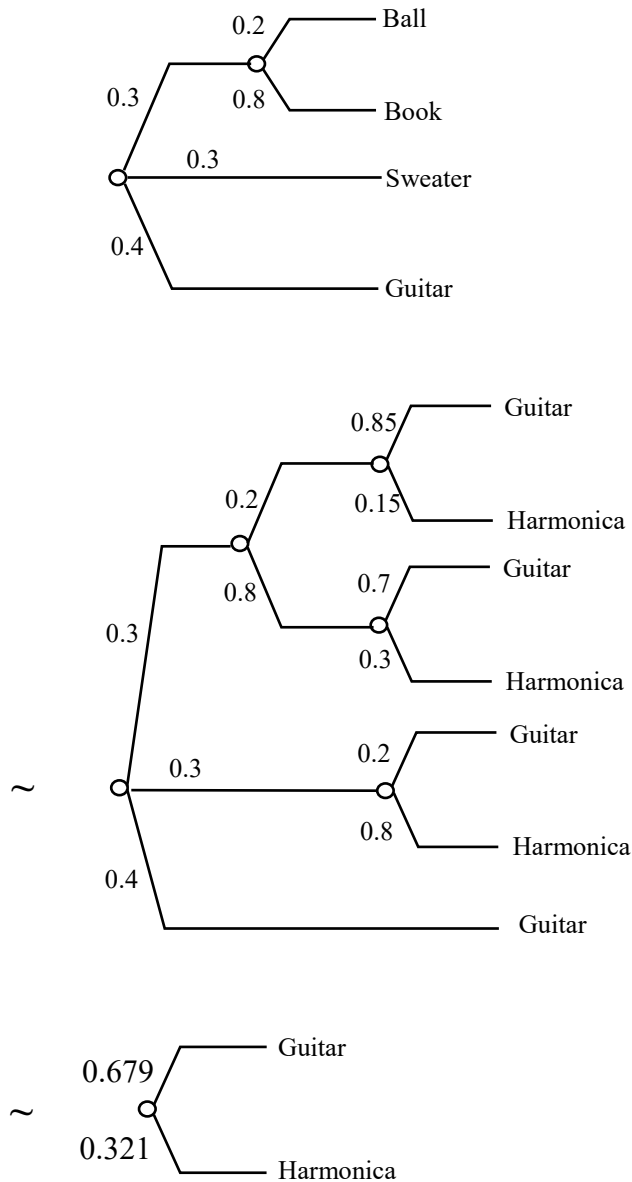
- The required Preference Probability with respect to Guitar-Harmonica Deal = **0.5485**

(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 = $0.7 > 0.679$ = 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 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).