P3.1

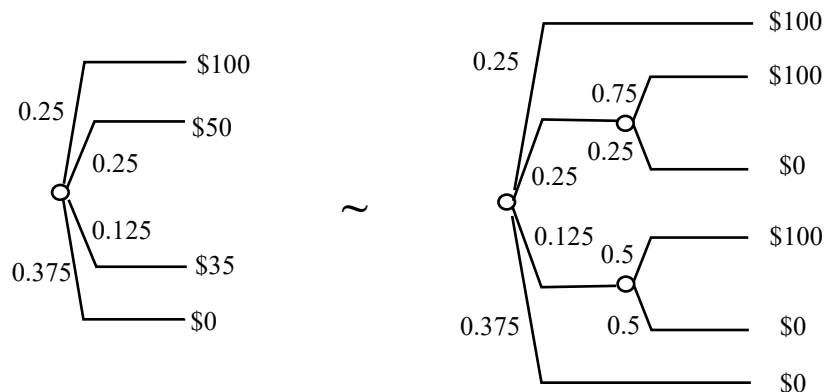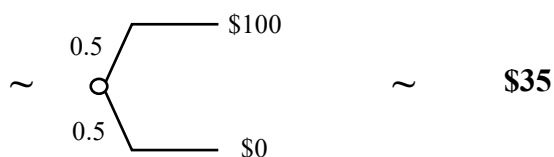*(a)* I would choose Deal A c/o **Choice Rule**.

(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

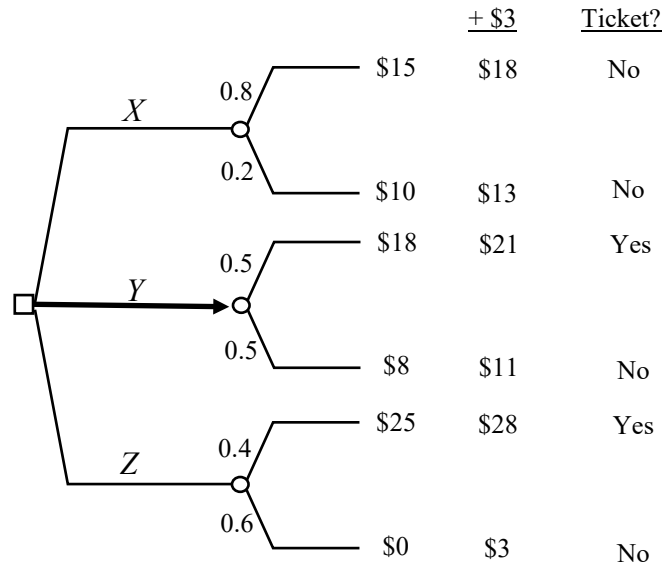- Using the substitution rule to replace the $50 and $35 outcomes with their respective equivalent deals:

- This can be simplified using the decomposition rule to:

- Hence Certainty Equivalent = $35.

P3.3

			+ $3	Ticket?
X	0.8	$15	$18	No
	0.2	$10	$13	No
Y	0.5	$18	$21	Yes
	0.5	$8	$11	No
Z	0.4	$25	$28	Yes
	0.6	$0	$3	No

- **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.
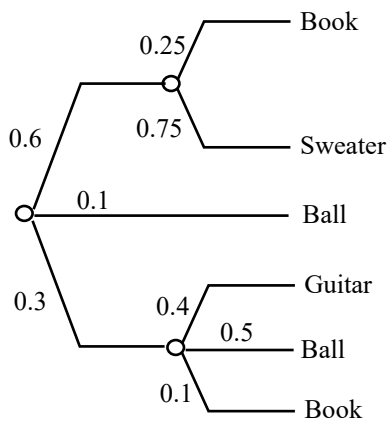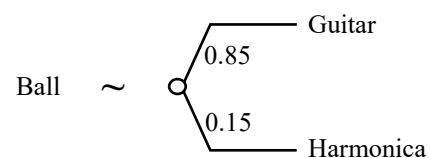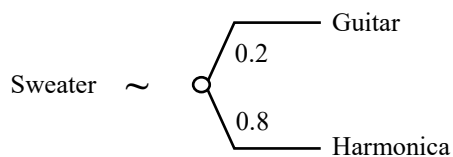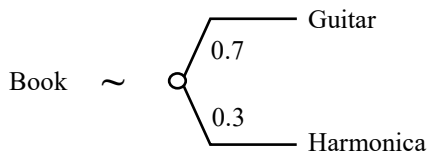
P3.4

(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:

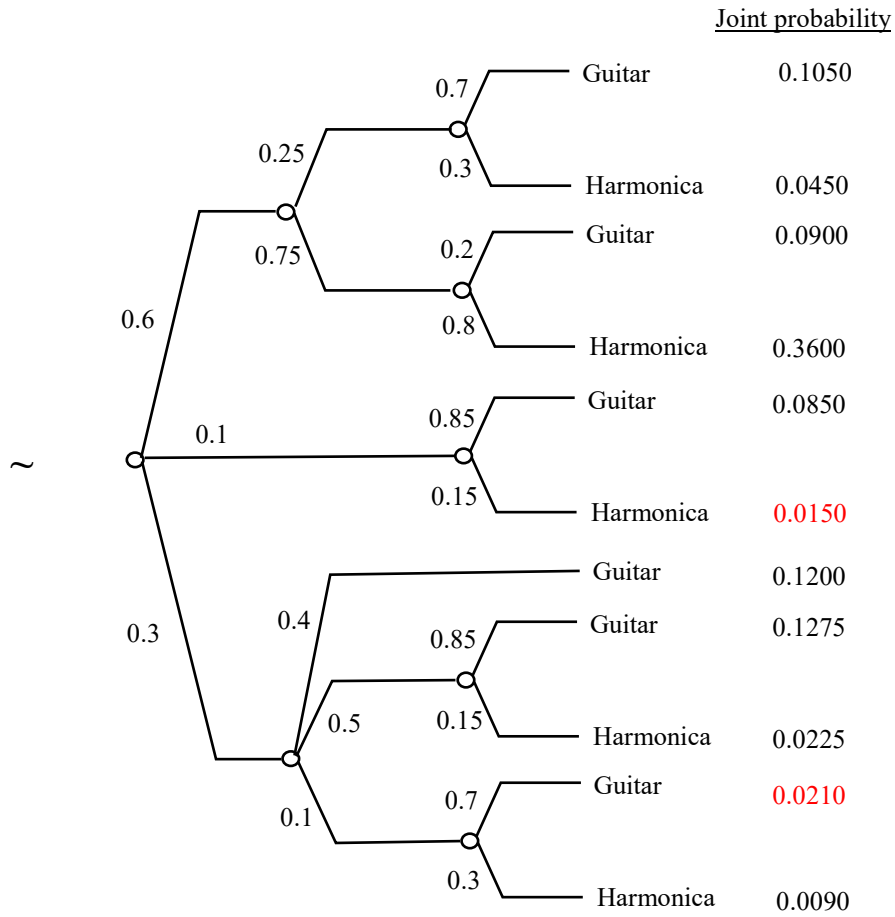 Guitar $\succ$ Ball $\succ$ Book $\succ$ Sweater $\succ$ Harmonica

(b)

- Given

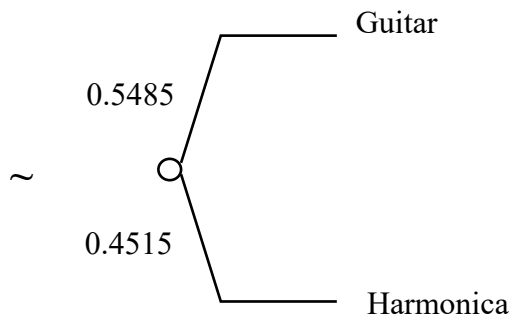- Substituting the following certainty equivalences into the above:

					Joint probability

Tree diagram:

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- 0.6
  - 0.25
    - 0.7 — Guitar — 0.1050
    - 0.3 — Harmonica — 0.0450
  - 0.75
    - 0.2 — Guitar — 0.0900
    - 0.8 — Harmonica — 0.3600
- 0.1
  - 0.85 — Guitar — 0.0850
  - 0.15 — Harmonica — 0.0150
- 0.3
  - 0.4 — Guitar — 0.1200
  - 0.5
    - 0.85 — Guitar — 0.1275
    - 0.15 — Harmonica — 0.0225
  - 0.1
    - 0.7 — Guitar — 0.0210
    - 0.3 — Harmonica — 0.0090
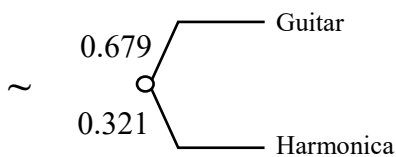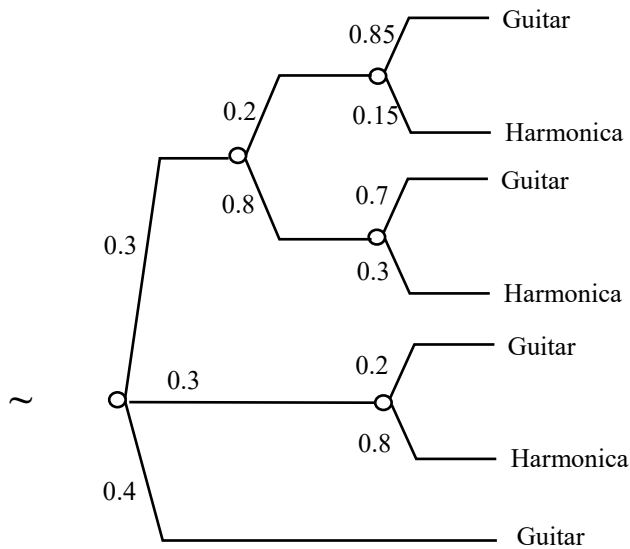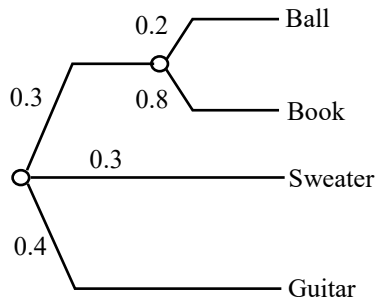
- By Decomposition Rule:

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- 0.5485 — Guitar
- 0.4515 — Harmonica

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

(c)

- The Book deal is equivalent to:

Book ~

- 0.7 — Guitar
- 0.3 — Harmonica
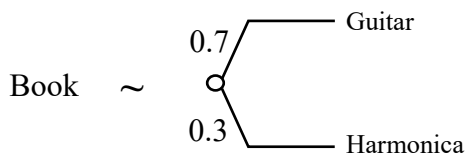
- Applying the Substitution and Decomposition rules to the given Deal:

- 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).