TIE4203 Decision Analysis in Industrial & Operations Management
Solutions to Tutorial #1

Question 1 (P1.2)

The \$45 you already paid is a sunk cost.

Your personal indifference selling prices (PISP) or certainty equivalent for the deal = \$75.

If you buy the information for \$$X$, you will receive \$$100 - X$ for sure.

At the point of indifference between buying and not buying the perfect information:

$$100 - X = 75 \quad \Rightarrow \qquad X = \$25.$$

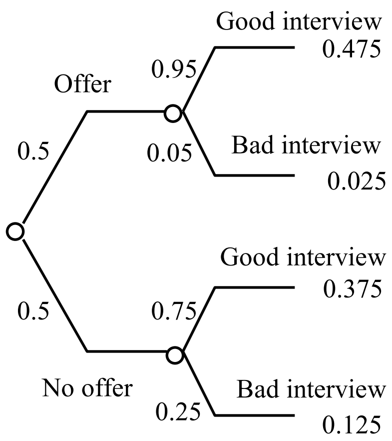
Note that this value is only an approximation, and is exact only under some conditions which you will learn in Chapters 4 and 6.

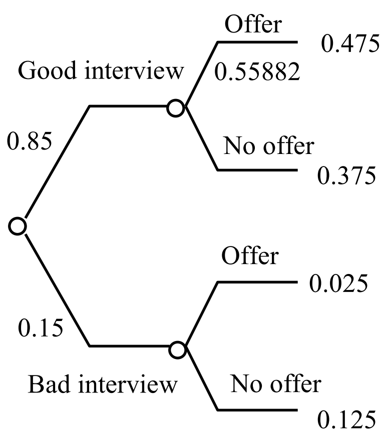
Question 2 (P1.3)

I.	His personal indifferent buying price =\$46	<u>Not necessarily true</u>
II.	His personal indifferent selling price = \$46	<u>Not necessarily true</u>
III.	His personal indifferent buying price ≥ \$46	<u>True</u>
IV.	His personal indifferent buying price ≤ \$46	<u>Not necessarily true</u>

Question 3 (P2.1)

Julie's information may be represented by the probability tree on the left. The order of conditioning is not in the correct direction. Hence we flip to the tree on the right:

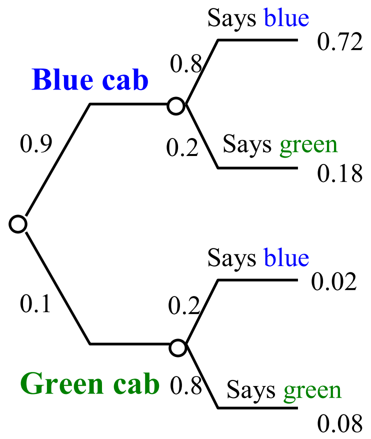




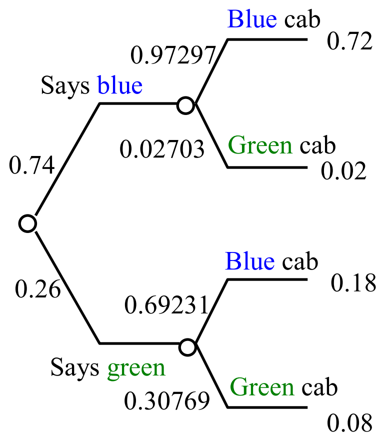
$p(\text{offer} \mid \text{good interview}) = 0.5588$

Question 4 (P2.2)

(*a*)



(*b*)

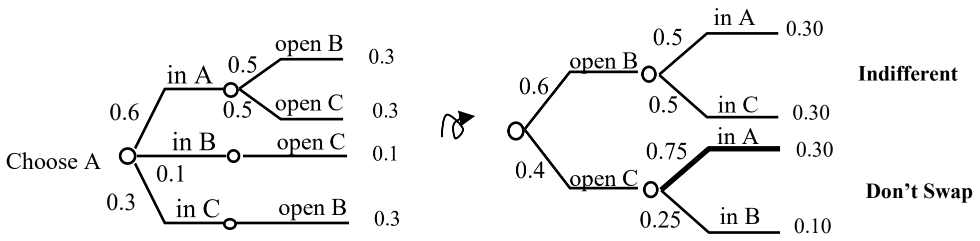


(*c*) If the witness says the cab was green, the judge should assign a probability of 0.308 that the actual cab was green.

(*d*) The witness' true-sighting rate was 80% compared with the correct assessment of 30.8%. This difference would be surprising if you had ignored the prior probability of a green cab which is 10%.

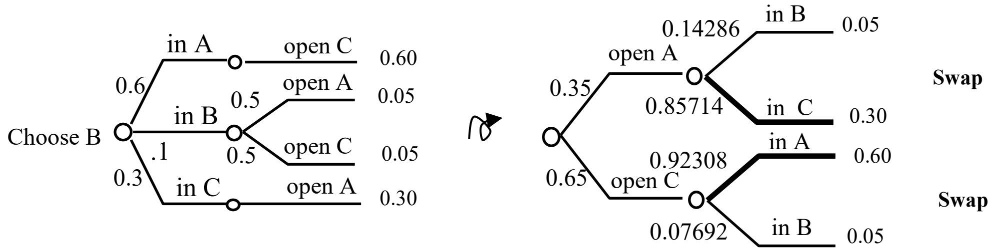
Psychologists have found that people often ignore the "base rate" in assessing probability leading to invalid probability values. In this case, ignoring the base rate would lead the judge to assign 80% chance that the cab was green based on the witness' account.

Question 5 (P2.3)



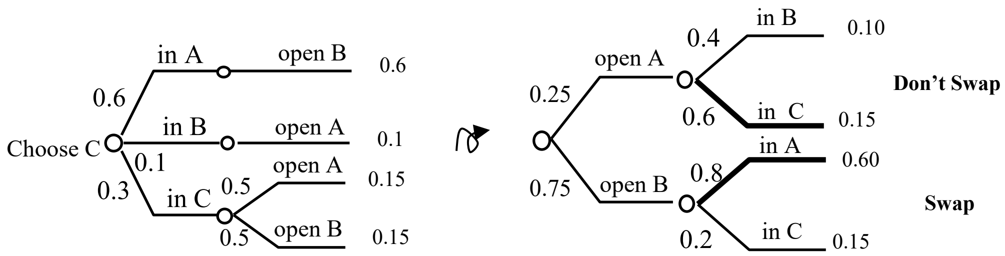
- If Box A is chosen:
  If host opens B, decision is indifferent as probability of A and C are equal
  If host opens C, decision is don’t swap as probability of A > probability of B

  Probability of Win on choosing A = 0.30 + 0.30 = 0.60



- If Box B is chosen:
  If host opens A, decision is swap as probability of C > probability of B
  If host opens C, decision is swap as probability of A > probability of B

  Probability of Win on choosing B = 0.30 + 0.60 = 0.90



- If Box C is chosen:
  If host opens A, decision is don’t swap as probability of C > probability of B
  If host opens B, decision is swap as probability of A > probability of C

  Probability of Win on choosing C = 0.15 + 0.60 = 0.75

- Conclusion: Choose Box B, and always swap after the host opens either A or C.
  Probability of win using this strategy = 0.9

- Note that here we used probabilistic reasoning to find the optimal decision to maximize probability of winning, by emulating all possible choices in separate trees. The problem can be solved more efficiently using a single decision tree or influence diagrams (Chapters 4 and 5).

Question 6 (P2.4)

III. Ella is ***equally likely*** to have seen the movie with either John or Peter

Draw the probability tree, flip it, and observe the equal probabilities of 0.5.