

## Part 1

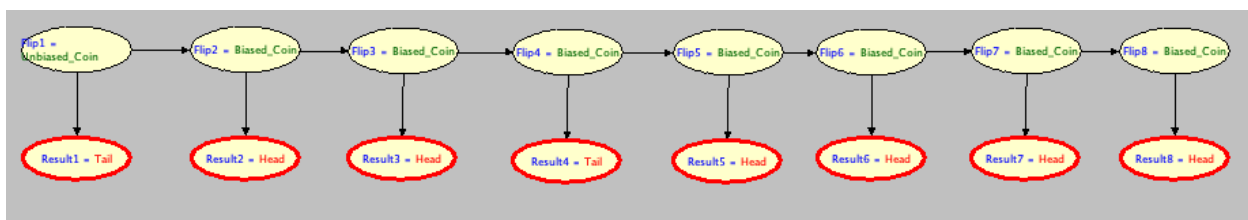
We have 8 Flip, with the first flip only using the unbiased coin. For Flip 2 to Flip 8, we have the following probability for getting an unbiased coin or biased coin. Take note that when a biased coin is used, the remaining Flip will only use a biased coin by giving a probability of 1.

Properties Probabilities Attributes		
Conditional Probability Table		
Flip1	Unbiased_Coin	Biased_Coin
Unbiased_...	0.6	0.0
Biased_Coin	0.4	1.0

For Result 1 to Result 8, we have the following probabilities for getting head or tail.

Properties Probabilities Attributes		
Conditional Probability Table		
Flip2	Unbiased_Coin	Biased_Coin
Head	0.5	0.7
Tail	0.5	0.3

Lisa managed to perform a coin switch from unbiased coin to biased coin. The coin switch in the second flip, in the image shows that it switch during Flip 2 when we set the given results.



## Part 2

The probabilistic query for solving this problem is the MAP query.

$P(\text{MAP}|e)$

MAP we are trying to find is  $F_1$  to  $F_8$

The evidence,  $e$  is  $R_1 = T, R_2 = H, R_3 = H, R_4 = T, R_5 = H, R_6 = H, R_7 = H, R_8 = H$

Such that  $F_1 = \text{Flip 1}$  and  $R_1 = \text{Result 1}$

MAP query =  $\text{argmax}_{F_1, \dots, F_8} P(F_1, \dots, F_8 \mid R_1 = T, R_2 = H, R_3 = H, R_4 = T, R_5 = H, R_6 = H, R_7 = H, R_8 = H)$

The results obtained are illustrated in the Figure below.

The screenshot shows a window titled "MAP Computation" with a macOS-style title bar. It contains a search interface with the following elements:

- Approximate** (selected) and **Exact** radio buttons.
- Search Method:** A dropdown menu showing "Tabo...".
- Initialization Method:** A dropdown menu showing "Sequ...".
- Maximum Search Steps:** A text input field containing "25".
- 8 MAP Variable...** with a link to [Variable Selection Tool](#).
- A list of variables: Flip1, Flip2, Flip3, Flip4, Flip5, Flip6, Flip7, Flip8.
- Results:** A table showing the MAP value for each variable.
- Buttons:** "Update", "find", "values" (dropdown), "+e", and a delete icon.
- Footer:** "Text", "Code Bandit", and "Close" buttons.

Variable	Value
Flip1	Unbiased_Coin
Flip2	Biased_Coin
Flip3	Biased_Coin
Flip4	Biased_Coin
Flip5	Biased_Coin
Flip6	Biased_Coin
Flip7	Biased_Coin
Flip8	Biased_Coin