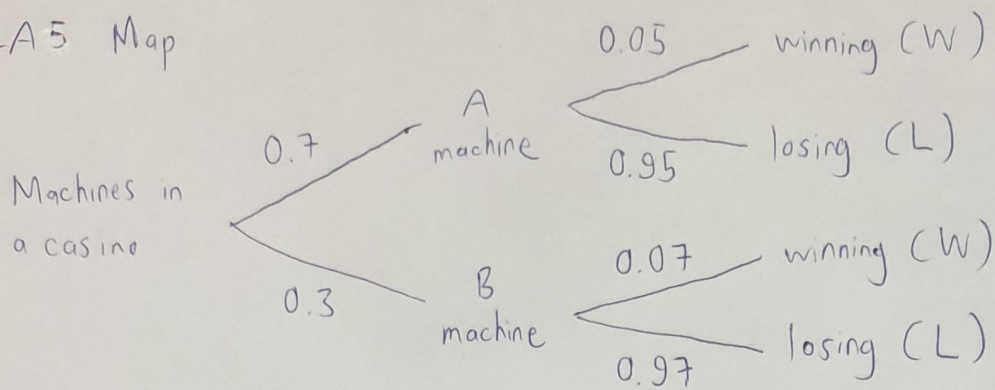


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1A Basic Rules of probability

1A5 Map



a) The probability that he wins when he plays once is

$$\begin{aligned} P(W) &= P(A) \cdot P(W|A) + P(B) \cdot P(W|B) \\ &= 0,7 \times 0,05 + 0,3 \times 0,07 \\ &= 0,056 \text{ (Answer)} \end{aligned}$$

b) If the gambler wins, what's the probability of type B machine?

According to Bayes's rule

$$P(B|W) = \frac{P(B) \cdot P(W|B)}{P(W)} = \frac{0,3 \times 0,07}{0,056} = 0,375 \text{ (Answer)}$$

1A6 : Sample Space : 4^{10} identifiers using A, B, C, D

a) How many identifiers are palindromes?

Palindrome structure: $\square \triangle \diamond \triangle \square \triangle \diamond \triangle \square$
5 letters 5 letters

=> If we know the first 5 letters, the latter 5 letters can be known. Since each slot has 4 options A, B, C, D => There are 4^5 different arrangements of 5 letters. Since the 5 latter are similar but backwards, there are also 4^5 palindromes = 1024 (Answer)

c) Probability of the chosen inhabitant having palindrome identifier

$$P(\text{palindrome}) = \frac{4^5}{4^{10}} = \frac{1}{1024}$$

b) How many identifiers are such that no two consecutive letters are identical?

For the first slot, we have 4 options A, B, C, D.

For second slot, since it can't repeat the letter of the first slot, it has only 3 options

This process repeats until the 10th slot

=> There are 4×3^9 identifiers not having identical two consecutive letters or 78732 (Answer)

d) Probability of the chosen inhabitant whose identifier has no 2 consecutive identical letters

$$P(\text{no identical}) = \frac{4 \times 3^9}{4^{10}} = \frac{19683}{262144}$$