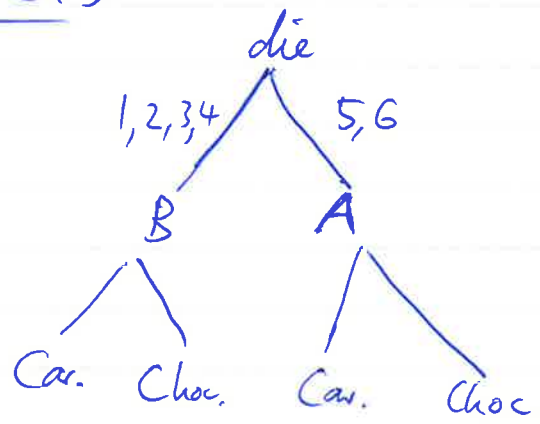
Example 1.3



$C :=$ child obtains a chocolate sweet.

$P(A) = \frac{1}{3}$ $P(B) = \frac{2}{3}$, $P(C|A) = \frac{P(C \cap A)}{P(A)} = \frac{10}{10+20} = \frac{1}{3}$

true but not helpful

$P(C|B) = \frac{5}{15+5} = \frac{1}{4}$

$P(C) = P(C \cap A) + P(C \cap B) = P(C|A)P(A) + P(C|B) \cdot P(B)$

↑ law of total probability ↑ multiplication rule

$= \frac{1}{3} \cdot \frac{1}{3} + \frac{1}{4} \cdot \frac{2}{3} = \frac{1}{9} + \frac{1}{6} = \frac{4+6}{36} = \frac{5}{18}$.