1. No arbitrage principle for American Call option

Consider the following strategy:

1) borrow \( V \) from bank. \(+V\)
2) buy the American call option at \( V \). \(-V\)
3) exercise the option to buy the underlying for \( K \).
4) return the borrowed money. \(-V\)

Based on No arbitrage principle: \( S - K - V \leq 0 \).

2. Event A: Students like chocolates
   Event B: Students like strawberriess
   \( P(A) = 0.6 \) \( P(B) = 0.7 \) \( P(A \cap B) = 0.4 \)

We want to know \( P(A^c \cap B) = P(A \cup B)^c = 1 - P(A \cup B) \)

\[ = 1 - \left[ P(A) + P(B) - P(A \cap B) \right] \]
\[ = 1 - 0.6 - 0.7 + 0.4 = 0.1 \]

3. \( P(\text{face is tail} | \text{toss is heads}) = \frac{P(\text{other face is tails } \cap \text{toss is head})}{P(\text{toss is heads})} \)

\[ = \frac{P(\text{other face is tail } \cap \text{toss is head})}{P(\text{toss is heads})} \]
\[ = \frac{\frac{1}{3} \times \frac{1}{2}}{1 \times \frac{1}{2} + 0 + \frac{1}{2} \times \frac{1}{3}} = \frac{\frac{1}{6}}{\frac{2}{3}} = \frac{1}{4} \]

4. No arbitrage principle: put

Consider the following strategy:

1) borrow \( S + V \) at time \( t \) from bank. \(+S + V\)
2) buy the European put option at \( V \). \(-V\)
3) buy the underlying asset at \( S \). \(-S\)
4) exercise the option to sell the underlying for \( K \). \(+K\)
5) return the borrowed money at time \( T \). \(-S - V\)

\( (S + V) e^{r(T-t)} \leq 0 \Rightarrow V \geq K e^{r(T-t)} - S \)