

# More Pishro-Nik Probabilities

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## Problem 31-1

*Problems in form of images...*

**Solution**

**Problem a:**

a.

$$P(\text{exactly 1 ace}) = \frac{\binom{4}{1} \cdot \binom{48}{4}}{\binom{52}{5}} = 0.2995$$

b.

$$\begin{aligned} P(\text{at least 1 ace}) &= 1 - P(\text{no aces}) \\ &= 1 - \left( \frac{45}{52} \cdot \frac{47}{51} \cdot \frac{46}{50} \cdot \frac{45}{49} \cdot \frac{44}{48} \right) \\ &= 1 - 0.6588 \\ &= 0.3412 \end{aligned}$$

**Problem b:**

$$\begin{aligned} P(\text{at least one duplicate}) &= 1 - P(\text{no duplicates}) \\ &= 1 - \left( 1 \cdot \frac{5}{6} \cdot \frac{4}{6} \cdot \frac{3}{6} \cdot \frac{2}{6} \right) \\ &= 1 - 0.0926 \\ &= 0.9074 \end{aligned}$$