

# Computation and Modeling Assignment 32

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## Problem 32-2

1. Five cards are dealt from a shuffled deck. What is the probability that the dealt hand contains

(a) exactly one ace;

**Solution:**

$$P(\text{exactly one ace}) = 5 \left( \frac{4(48!)(47!)}{(44!)(52!)} \right) = 0.2994735$$

(b) at least 1 ace?

**Solution:**

$$P(\text{no aces}) = \frac{(48!)(47!)}{(43!)(52!)}$$

$$\begin{aligned} P(\text{at least one ace}) &= 1 - P(\text{no aces}) \\ &= 1 - \frac{(48!)(47!)}{(43!)(52!)} \\ &= \frac{(43!)(52!) - (48!)(47!)}{(43!)(52!)} \\ &= 0.3411580 \end{aligned}$$

2. You roll a die 5 times. What is the probability at least one value is observed more than once?

**Solution:**

$$P(\text{value observed only once}) = \frac{5!}{6^5} = 0.0154321$$

$$\begin{aligned} P(\text{value observed more than once}) &= 1 - P(\text{value observed only once}) \\ &= 1 - \frac{5!}{6^5} \\ &= 0.9845679 \end{aligned}$$