

Homework 1 Hints

1. 100!. I'm assuming that all 100 people are distinct.

2. $(50!)^2$

3. $\frac{2(50!)^2}{100!}$ Be sure you see where the factor of 2 comes from.

4.

$$\frac{13}{\binom{52}{4}}; \quad \frac{12 \cdot 11 \cdot 10}{51 \cdot 50 \cdot 49}; \quad \frac{2560}{\binom{52}{4}}.$$

5.

$$\frac{6}{5 \cdot 7 \cdot 17}; \quad 4 \frac{\binom{13}{5} \binom{39}{2} + \binom{13}{6} \binom{39}{1} + \binom{13}{7}}{\binom{52}{7}}.$$

Dekking exercise 2.1: Let A and B be two events in a sample space for which $P(A) = 2/3$, $P(B) = 1/6$, and $P(A \cap B) = 1/9$. What is $P(A \cup B)$?

The answer is $2/3 + 1/6 - 1/9 = 13/18$.

2.3 Let C and D be two events for which one knows that $P(C) = 0.3$, $P(D) = 0.4$, and $P(C \cap D) = 0.2$. What is $P(C^c \cap D)$?

The answer is 0.2. Additional hint: the answer does not depend on the value of $P(C)$.

2.6 When $P(A) = 1/3$, $P(B) = 1/2$, and $P(A \cup B) = 3/4$, what is (a) $P(A \cap B)$?; (b) $P(A^c \cup B^c)$?

(a) 1/12

(b) 11/12

2.7 Let A and B be two events. Suppose that $P(A) = 0.4$, $P(B) = 0.5$, and $P(A \cap B) = 0.1$. Find the probability that A or B occurs, but not both.

The answer is 0.7.

Hajek: Chapter 1.7: Problems 1.1, 1.3

1.1 The cardinality is 720.

1.3 First hint: this is harder than I realized. I should have put this on the 2nd homework assignment.

Second hint:

$$\frac{\binom{10}{2} \binom{8}{2} \binom{6}{2} \binom{4}{2}}{5!}$$

OR

$$\frac{10!}{2^5 5!}.$$

(Same numerical value arrived at in two different ways.)

Part (b). First hint: separate into cases: all dyads (pairs); two dyads and two triads. .
Second hint:

$$\frac{10!}{2^5 5!} + \frac{10!}{2^2 (3!)^2 2^2}.$$