(Textbook, exercise 1.29) At a political meeting there are 7 liberals and 6 conservatives. We choose five people uniformly at random to form a committee. Let A be the event that we end up with a committee consisting of more conservatives than liberals.

(a) Describe a possible sample space for this experiment, and the event A in your sample space.

(b) Compute P(A).

(a) Ω = { subset of size 5 of the given 13 people }

example for a possible element in Ω : 2 liberals + 3 conservatives

event A = { 5 conservatives } $\cup$ { 4 conservatives + 1 liberals }

$\cup$ { 3 conservatives + 2 liberals }

(b) Let A_1 be the event that there are 5 conservatives

Let A_2 be the event that there are 4 conservatives + 1 liberals

Let A_3 be the event that there are 3 conservatives + 2 liberals.

Also, A_1, A_2, A_3 are disjoint events

Thus,

$$P(A) = P(A_1 \cup A_2 \cup A_3) = P(A_1) + P(A_2) + P(A_3)$$

$$= \frac{\binom{6}{5}}{\binom{13}{5}} + \frac{\binom{6}{4}\cdot\binom{7}{1}}{\binom{13}{5}} + \frac{\binom{6}{3}\binom{7}{2}}{\binom{13}{5}}$$

$$= \frac{59}{143}$$