(rather hard)

modified from Freedman, Pisani and Purves; Statistics, 4e

In 1969, Dr Spock came on trial. He would have liked women on his jury. The jury was drawn from a panel of 350 people chosen by a clerk. There were 102 women in the panel. At the next stage, the judge chose 100 potential jurors from the 350 on the panel. This pool included 9 women.

(a) 350 people are chosen at random from a very large population, which is 50% female. What is the probability that the sample contains 102 women?

This is binomial - we get (350 choose 102) x (1/2)^(350)

(b) 100 people are chosen at random, without replacement, from a group of 102 women and 248 men. What is the probability that this group contains 9 women?

we can do this as ~~#(of groups of 9 distinct women)/#(of groups of 100 individuals)~~
so this becomes

~~(102x101x... 9 terms)/(350 choose 100)~~

(straightforward)
The correlation between height and weight for men aged 18-74 in the US is about 0.4. For each of the statements below, say whether this follows from the data, and explain your answer.

(a) Taller men tend to be heavier

yes, because data items where height is larger tend to have larger weight (+ correlation)

(b) The correlation between weight and height for men aged 18-74 in the US is about 0.4

yes because correlation is symmetric

(c) Heavier men tend to be taller

yes, as above

(d) If you put on 10 pounds, you are likely to grow taller

NO - correlation isn't causation

(straightforward)

Urns I, II, and III each contain four pieces of paper, with the numbers 1... 4 on them. I shake each urn, and draw one piece of paper from each.

(a) What is the probability that all four numbers are the same?

#(of draws where event occurs)/#(of draws)=4/4x4x4=1/16

(b) What is the probability that all four numbers are different?

#(of draws where event occurs)/#(of draws)

#(of draws where event occurs)=4x3x2
(4 choices of first no, 3 choices of second, 2 of third)

so we get 6/16