Math 411 — Problem Set 4
Issued: 07.02 Due: training

4.1. 10 people get on an elevator on the first floor of a seven-story building. Each gets off at one of the six higher floors chosen at random independently, what is the expected number of stops the elevator makes?

4.2. Suppose $X$ takes on the values -2, -1, 0, 1, 2 with probability 1/5 each, and let $Y = X^2$. Find $\text{cov}(X, Y)$. Are $X$ and $Y$ independent?

4.3. Suppose we toss a coin 100 times. Which is bigger, the probability of exactly 50 heads or at least 60 heads?

4.4. Suppose that each of 300 patients has a probability of 1/3 of being helped by a treatment. Find approximately the probability that more than 120 patients are helped by the treatment.

4.5. Suppose that we roll two dice 180 times and we are interested in the probability that we get exactly 5 double sixes. Find (a) the normal approximation, (b) the exact answer, and (c) the Poisson approximation.

4.6. A die is rolled repeatedly until the sum of the numbers obtained is larger than 200. What is the probability that you need more than 66 rolls to do this?

4.7. Among 625 randomly chosen Swedish citizens, it was found that 25 had previously been citizens of another country. Find a 95% confidence interval for the true proportion.

4.8. For a class project, you are supposed to take a poll to forecast the outcome of an election. How many people do you have to ask so that with probability 0.95 your estimate will not differ from the true outcome by more than 5%?