

## Homework assignment 6c

1. Suppose  $x \sim \text{Bin}(25, p = 0.6)$ . Using the appropriate table, determine the following:  $P[x = 0]$ ,  $P[x = 3]$ ,  $P[x = 6]$ ,  $P[x = 9]$ ,  $P[x = 12]$ ,  $P[x = 15]$ ,  $P[x = 20]$ ,  $P[x = 21]$ , and  $P[x = 25]$ .
2. Suppose  $x \sim \text{Bin}(25, p = 0.4)$ . Using the appropriate table, determine the following:  $P[x \leq 0]$ ,  $P[x \leq 3]$ ,  $P[x \leq 6]$ ,  $P[x \leq 9]$ ,  $P[x \leq 12]$ ,  $P[x \leq 15]$ ,  $P[x \leq 20]$ ,  $P[x \leq 21]$ , and  $P[x \leq 25]$ .
3. Using the hypergeometric distribution, with  $N = 4$ ,  $n = 2$ , and  $k = 3$ , determine the following:  $P[x = 0]$ ,  $P[x = 1]$ , and  $P[x = 2]$ . What is the  $\mathbb{E}[x]$ ? What is  $\sigma^2$ ?
4. A jar contains 10 NYC subway passes of which 6 have a balance of zero dollars. You randomly select one card for yourself, one for your friend, and an additional spare card from the jar, without replacement. What is the probability that two of the cards have a non-zero balance?
5. In a criminal trial, there are 25 persons who have been approved by both parties for possible inclusion in the eventual jury of 12. Of those who have been approved, there are 14 women and 11 men. If the judge forms the final jury of 12 by randomly selecting individuals from the approved listing, what is the probability that at least half of the eventual jurors will be males?
6. Unknown to a rental car office, 3 of the 12 subcompact models now available for rental are subject to a safety recall soon to be announced

by the National Highway Traffic Safety Administration. Five subcompacts will be rented today, and the cars will be randomly selected from those available in the pool. What is the probability that exactly one of the recall-affected cars will be rented today? What is the probability that all three of the recall-affected cars will be rented today?

7. Among 25 faculty, 3 have blood type  $O^-$ . Suppose we draw a simple random sample of the faculty,  $n = 20$ . Let the random variable  $x$  represent the number of faculty in the sample that *don't* have blood type  $O^-$ .
  - a If the sample was drawn with replacement, determine  $P[x = 5]$ ,  $P[x = 10]$ ,  $P[x = 15]$ ,  $P[x = 18]$ ,  $\mathbb{E}[x]$ , and  $Var(x)$ .
  - b If the sample was drawn without replacement, determine  $P[x = 5]$ ,  $P[x = 10]$ ,  $P[x = 15]$ ,  $P[x = 18]$ ,  $\mathbb{E}[x]$ , and  $Var(x)$ .
8. For a discrete random variable that is Poisson distributed with  $\lambda = 2$ , determine the following:  $P[x = 0]$ ,  $P[x = 1]$ ,  $P[x = 2]$ ,  $P[x = 4]$ ,  $P[x = 6]$ ,  $P[x = 8]$ , and  $P[x < 3]$ . What is the  $\mathbb{E}[x]$ ? What is  $\sigma^2$ ?
9. A 911 call agent receives an average of three calls an hours. If she decides to leave for lunch for an hour, what is the probability that she misses 0, 1, 2, 3, and 8 calls during that particular hour?