

Homework 2 — Probability, Counting, Bayes' Formula (§4.1–4.5)

(Due: Wednesday Sep 09, before class)

Please submit a hard copy of your homework before class and email your R code, if applicable, to Alex Goebel at AJGOEBEL@email.sc.edu

- 1.** A statistics class has 8 juniors and 12 seniors. A committee of 4 students is selected at random. (a) In how many ways can the committee be formed? (b) What is the probability the committee has exactly 2 juniors and 2 seniors?
- 2.** Let A and B be events with $P(A) = 0.4$, $P(B) = 0.5$, and $P(A \cap B) = 0.2$. (a) Find $P(A \cup B)$. (b) Find $P(A | B)$. (c) Are A and B independent? Justify using the definition of independence.
- 3.** A diagnostic test for a rare disease is 95% sensitive [$P(\text{positive} | \text{disease}) = 0.95$] and has a 3% false-positive rate [$P(\text{positive} | \text{no disease}) = 0.03$]. The disease occurs in 1% of the population. Use Bayes' formula to find $P(\text{disease} | \text{positive test result})$.
- 4.** A password must consist of 3 distinct letters followed by 2 distinct digits (0–9). How many different passwords are possible?