

Assignment #4 — Due Friday, October 7 by 4:00 P.M.

Turn in homework to your TA's mailbox using this sheet as the cover page.

Fill in your name and also circle the *lecture section in which you are registered* and circle the *discussion section you expect to attend* to pick up this assignment.

Name:

Lecture 1 (Hanlon). **311:** Tu 1:00 - 2:15pm **312:** Th 8:00 - 9:15am **313:** We 1:00 - 2:15pm

Lecture 2 (Larget). **321:** Tu 1:00 - 2:15pm **322:** We 2:30 - 3:45pm **323:** We 1:00 - 2:15pm

Please answer the following questions.

1. We have three buckets containing balls. Bucket 1 contains four black balls, five red balls, and three white balls; Bucket 2 contains 1 black ball, four red balls, and seven white balls; and Bucket 3 contains 80 black balls and 20 white balls. We run the following experiment. First we randomly select a bucket in such a way that Bucket 1 is selected with probability 0.1, Bucket 2 is selected with probability 0.2, and Bucket 3 is selected with probability 0.7. Then we draw a ball at random from the selected bucket.
 - (a) What is the probability that the ball is black?
 - (b) What is the probability that the ball is red?
 - (c) What is the probability that the ball is white?
 - (d) Now suppose that someone has performed this experiment and tells us that the selected ball was black. What is the probability that it came from Bucket 1? Bucket 2? Bucket 3?
 2. We have two buckets containing balls. Bucket 1 contains seventeen black balls, six red balls, and eight white balls. Bucket 2 contains 40 black balls, 30 red balls, and 25 white balls. Consider the following experiment. First we randomly select a bucket with equal probability. Then we draw a ball at random from the selected bucket.

We repeat this experiment, independently, n times. In the n trials, let B be the number of black balls selected, R be the number of red balls selected, and W be the number of white balls selected.

 - (a) Let $n = 1$. Compute $P(B = 1)$, $P(R = 1)$, and $P(W = 1)$.
 - (b) Let $n = 10$. What is the distribution of B ? R ? W ?
 3. The blood type distribution in the United States during World War II was the following: type A 43%, type B 7%, type AB 4%, and type O 46%. During the war, 4% of soldiers with true blood type O blood were misclassified as type A; 88% of those with type A blood were correctly typed; 4% with true type B were typed as A; and 10% with true type AB were typed as A. A soldier was wounded and brought to surgery. He was typed as having type A blood. What is the probability that this was his true blood type?
 4. Textbook p.124, Problem 17
 5. Textbook p.124, Problem 19
 6. Textbook p.124, Problem 21
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