

You may work in pairs or purely individually for this assignment. Prepare your answers to the following questions in a plain ASCII text file or MS Word document. Submit your file to the Curator system by the posted deadline for this assignment. No late submissions will be accepted. If you work in pairs, list the names and email PIDs of both members at the beginning of the file, and submit your solution under only one PID. No other formats will be graded.

For this assignment, you may (and are encouraged to) work in pairs; if you do so, you must also write your solutions in such a way that it is clear how each member contributed to deriving the solution.

You will submit your answers to the Curator System (www.cs.vt.edu/curator) under the heading OOC06.

For the questions on probability, express your answer first in terms of appropriate notation (factorials, combinations, permutations), and then **for parts 1a - 1c** simplify your answer to a single decimal value, rounded to two digits after the decimal point. Do not simplify your answers for parts **1d - 1e**.

1. An urn contains 8 red balls, 6 blue balls, 7 green balls, and 10 yellow balls.
 - a) [15 points] If two balls are drawn randomly from the urn, what is the probability that they will be of the same color?
 - b) [15 points] If six balls are drawn randomly from the urn, what is the probability that they will be of six different colors?
 - c) [15 points] If six balls are drawn randomly from the urn, what is the probability there will be two balls of one color and four balls of another color?
 - d) [10 points] If three balls are drawn from the urn, and all of them are yellow, what is the probability that the next ball drawn will also be yellow?
 - e) [10 points] If three balls are drawn from the urn, and all of them are yellow, what is the probability that the next ball drawn will be blue?

2. Consider randomly selecting cards from a standard 52-card poker deck.
 - a) [10 points] In how many different ways can you construct a 5-card hand so that the hand contains 2 cards of one value and 3 cards of different values than all the other cards in the hand?
 - b) [10 points] In how many different ways can you construct a 7-card hand so that the hand contains 2 cards of one value, 4 cards of another value, and a single card of a different value than all the other cards in the hand?

3. [15 points] A coin is tossed 100 times. The coin is "fair" in the sense that on any single toss it is equally likely to land heads-up or tails-up. What is the probability that the coin will land heads-up exactly 50 times?

For credit, you must explain carefully the logic you used to derive your answer.