

Sample Exam 2
Math 142, Fall 2022

Note that the coverage the last time I taught Math 142 was quite different, so no guarantees that your upcoming exam will cover the same topics covered here. As always, your best guide is the relevant homework, namely, PS04–06.

1. In the game of eightball, 15 distinct billiard balls can be put into 6 distinct pockets. If there is no upper limit on the capacity of a pocket, in how many different ways can we put all of the balls into pockets (possibly leaving some pockets empty)?

2. The governors of Nevada and California are selecting two people for a commission on cross-border relations. They must select one person from Nevada, and one from California, and they must also select one Democrat and one Republican. If there are 17 qualified Democrats and 13 qualified Republicans from California, and 7 qualified Democrats and 19 qualified Republicans from Nevada, how many possible commissions can the governors select?

Show all your work. In particular, you must include enough work to make it clear how you obtained your answer. **DO NOT SIMPLIFY** your final answer.

3. What is the probability that a random 7-card hand has both two different pairs and also 3 of a kind (e.g., 7788QQQ)?

Show all your work. In particular, you must include enough work to make it clear how you obtained your answer. **DO NOT SIMPLIFY** your final answer.

4. In how many ways can we hand out 8 identical red hats and 4 distinct scarves to 11 distinct children, if each child receives no more than 1 hat, and each child receives no more than 1 scarf?

5. Olivia is packing lunch bags for herself, Irene, and Stefan. She has 9 different (distinct) snacks to pack, and she wants to put at least 2 snacks in each pack. In how many ways can she pack the 3 (distinct) lunch bags?

6. If you choose a random 5-digit number (i.e., an integer between 10000 and 99999, inclusive), what is the probability of choosing a number that has no pair of consecutive digits the same and also does **not** contain the digits 5 or 6?

Show all your work. In particular, you must include enough work to make it clear how you obtained your answer. **DO NOT SIMPLIFY** your final answer.

7. How many arrangements of the word MISSISSIPPI are there with no two of the I's consecutive? Show all your work.

8. How many ways can you arrange the letters in the word CIVILITY so that C is followed either by I or by V?

Show all your work. In particular, you must include enough work to make it clear how you obtained your answer. **DO NOT SIMPLIFY** your final answer.