# MAT 230 Module Four Homework

**General:**

* Before beginning this homework, be sure to read the textbook sections and the material in Module Four.
* Type your solutions into this document and be sure to show all steps for arriving at your solution. Just giving a final number may not receive full credit.
* You may copy and paste mathematical symbols from the statements of the questions into your solution. This document was created using the Arial Unicode font.
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1. Suppose that a company will select 3 people from a collection of 15 applicants to serve as a regional manager, a branch manager, and an assistant to the branch manager. In how many ways can the selection be made? Explain how you got your answer.

This problem is similar to Examples 6 and 8 and to Exercises 14 and 15 in Section 3.1 of your SNHU MAT230 textbook.

To find out how many people a company would put into 3 different positions out of 15 applicants, the easiest way to do this is to use the slot method. For regional manager, the pool will be out of all 15 people, for branch manager, the pool will be 14 people, and for the assistant manager, the pool will be 13 people. Given this, we can just multiply the slots together to get our answer.

So, there are 2730 ways to choose those 3 positions out of a pool of 15 people.

1. How many distinguishable permutations can be made of the letters in the word POSSIBILITIES? Explain how you got your answer.

This problem is similar to Example 10 and to Exercises 20 to 23 in Section 3.1 of your SNHU MAT230 textbook.

The number of distinguishable permutations that can be formed from a collection of n objects where the first object appears times, the second object appears times, and so on is

So for POSSIBILITIES, that gives us

permutations

1. There are two display cases, one with 18 flowers and one with 15 flowers. How many ways can you choose 3 flowers from the first case and 2 from the second case?

This problem is similar to Example 6 and to Exercises 25 to 26 in Section 3.2 of your SNHU MAT230 textbook.

This is a combination problem. In order to determine the number of ways possible, for the first case this would be written as 18C3 which as an equation would read:

Figuring out the number of combinations in the second case is similar to the first.

So that gives us 816 ways for the first case and 105 ways from the second case.

1. A fair 6-sided die is rolled 5 times and the result is recorded for each roll.
   1. How many different sequences of results are possible? Explain how you got your answer.
   2. Of the possible sequences of results, how many of them contain exactly 3 rolls of a 4? Explain how you got your answer.

This problem is similar to Example 3 in Section 3.1 / Example 6 in Section 3.2 and to Exercises 21 to 22 in Section 3.2 of your SNHU MAT230 textbook

1. For this we can use the slot method again. There are five results that are recorded and six possible ways for the die to land each time. So we have 65, or 7,776 sequences.
2. There are 8 ways for the dice to land where there are 3 fours and the other two die are something else. Given that the remaining two dice in whatever configuration can be one of 62 sequences, that means we can multiply 36 by 8 to get 288 sequences that contain exactly 3 rolls of four.
3. Show that if 17 integers from 1 to 32 are chosen, then there will be 2 of them that add up to 33.

This problem is similar to Example 2 and to Exercise 2 in Section 3.3 of your SNHU MAT230 textbook.

To show this, we can construct sets of two numbers. A1 = {1, 32}A2 = {2, 31}A3 = {3, 30}A4 = {4, 29}A5 = {5, 28}A6 = {6, 27}A7 = {7, 26}A8 = {8, 25}A9 = {9, 24}A10 = {10. 23}A11 = {11, 22}A12 = {12, 21}A13 = {13, 20}A14 = {14, 19}A15 = {15, 18}A16 = {16, 17}

Since there are only 16 sets to choose from, if 17 numbers are selected, it will complete one of the sets and therefore will add up to 33.

1. Show that there must be at least 59 ways to choose 5 integers from 1 to 15 so that all the choices have the same sum.

This problem is similar to Examples 6 and 7 and to Exercise 10 in Section 3.3 of your SNHU MAT230 textbook.

Min sum: 1 + 2 + 3 + 4 + 5 = 15

Max sum: 15 + 14 + 13 + 12 + 11 = 65

Total of sums: 51

15C5 =

1. Jack is climbing stairs, taking one or two steps at a time. Let sn be the number of ways that Jack can climb n steps.

This problem is similar to Example 2 and to Exercise 11 in Section 3.5 of your SNHU MAT230 textbook.

1. Give a recurrence relation for sn. Explain your equation and be sure to include the initial conditions.
2. In how many ways can Jack climb 10 steps?
3. Let an = –3an-1 + 10an-2 with initial conditions a1 = 29 and a2 = –47.

This problem is similar to Example 7 and to Exercises 18 and 19 in Section 3.5 of your SNHU MAT230 textbook.

1. Write the first 5 terms of the recurrence relation.
2. Solve this recurrence relation. Show your reasoning.
3. Using the explicit formula you found in part b, evaluate a5. You must show that you are using the equation from part b.
4. 29, -47, 431, -1763, 9599