Homework 3

Math 105

Due July 4th at 11:59 PM

Textbook Exercises

2.2: 3, 5, 7, 23, 24, 25, 26

2.3: 1, 3, 5, 9, 17

2.4: 1, 3, 5, 7, 11, 15, 21, 27, 31

Exercise 1: 500 people are surveyed on their computer's operating system. 200 own a computer with macOS, another 200 own one with Windows, and 50 own one with Linux. 30 people own both a macOS and Windows computer, 20 both Windows and Linux, and just 2 people have computers with all three. 150 of the 200 macOS owners have that as their only computer.

 a) How many people own macOS and Windows computers, but not a Linux one?

 b) How many people own macOS and Linux computers, but not a Windows one?

 c) How many people don't own any computer with one of these three operating systems?

Exercise 2: Seven people go to a movie theater and take seats in the same row of seven chairs. Two are wearing hats and five aren't, and the hat-wearers refuse to sit next to one another. Find the number of ways the seven people can order themselves with the following steps:

a) First ignore the hat-wearers and find the number of ways all seven people can sit down, with no restrictions.

b) Now forget about all the people for a moment. How many ways can you choose two seats that are next to each other?

c) Now find the number of ways two people can sit next to one another, using your answer to the previous part. Explain your reasoning.

d) Imagine taking a situation from the previous part and removing the two seats that the people are sitting in, so that there are five seats left. How many ways can five people sit in those seats?

e) Now you have enough information to solve the problem. Using your answers to the previous two parts, find the number of ways you can sit the seven people so that the the two hat-wearers **do** sit next to one another.

f) Finally, find the number of ways the people can sit down so that the hat-wearers don't sit next to each other.