

# Chapter 7.1 and 7.2 Excersizes

## Question 1

A schoool has 147 thrid graders. The third grade teachers have planned a special treat for the last day of school and brought ice cream for their students. There are three flavors: mint chip, chocolate, and strawberry. Suppose that 60 students like (at least mint chip, 103 like chocolate, 50 like strawberry, 30 like mint chip and strawberry, 40 like mint chip and chocolate, 25 like chocolate and strawberry, and 18 like all three flavors. How many students don't like any of the flavors available?

$$147 - (18 + 7 + 22 + 12 + 13 + 56 + 8) = 11$$

## Question 3

How many positive integers less than or equal to 100 are divisible by 2? How many positive integers less than or equal to 100 are divisible by 5? Use this information to determine how many positive integers less than or equal to 100 are divisible by *neither* 2 nor 5.

$$100 - (100 - 50 - 20 + 10) =$$

$$= 60$$

## Question 5

How many positive integers less than or equal to 1000 are divisible by none of 3, 8, and 25?

$$1000 - (1000 - 333 - 125 + 41 - 40 + 13 + 5 - 1) =$$

$$= 440$$

## Question 6

The State of Georgia is distributing 173 million in funding to the Fulton, Gwinnett, DeKalb, Cobb, and Clayton counties (in millions of dollars). In how many ways can this distribution be made, assuming that each country receives at least 1 million, Clayton country receives at most 10 million, and Cobb county receives at most 30 million? What if we add the restriction that Fulton county is to receive at least 5 million (instead of at least 1 million)?

$$\binom{173}{4} - \binom{163}{4} - \binom{143}{4}$$

$$\binom{169}{4} - \binom{159}{4} - \binom{139}{4}$$

## Question 7

How many integer solutions are there to the equation  $x_1 + x_2 + x_3 + x_4 = 32$  with  $0 \leq x_i \leq 10$  for  $i = 1, 2, 3, 4$ ?

$$\binom{36}{3} - \binom{26}{3} - \binom{26}{3} - \binom{26}{3} - \binom{26}{3}$$

## Question 8

How many integer solutions are there to the inequality

$$y_1 + y_2 + y_3 + y_4 < 184$$

with  $y_1 > 0$ ,  $0 < y_2 \leq 10$ ,  $0 \leq y_3 \leq 17$  and  $0 \leq y_4 < 19$ ?

$$\binom{186}{3} - \binom{176}{3} - \binom{169}{3} - \binom{167}{3}$$

## Question 9

A graduate student eats lunch in the campus food court every Tuesday over the course of a 15-week semester. He is joined each week by some subset of a group of six friends from across campus. Over the course of a semester, he ate lunch with each friend 11 times, each pair 9 times, and each triple 6 times. He ate lunch with each group of four friends 4 times and each group of five friends 4 times. All seven of them ate lunch together only once that semester. Did the graduate student ever eat lunch alone? if so, how many times?

It says he ate each week with some subset of a group of six friends so therefore he never ate alone by that rule.