Assignment 7 – Part 1
p565 Set 9.2 - 11.c, 14.c,e, 17, Set 9.3 - 5, 24, 33-e,f

11. **a.** A bit string is a finite sequence of 0's and 1's. How many bit strings have length 8?
    b. How many bit strings of length 8 begin with three 0's?
    c. How many bit strings of length 8 begin and end with a 1?

11.c.) $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 1 = 2^7 = 128$

14. Suppose that in a certain state, all automobile license plates have four letters followed by three digits.
    a. How many different license plates are possible?
    b. How many license plates could begin with A and end in 0?
    c. How many license plates could begin with *TGIF*?
    d. How many license plates are possible in which all the letters and digits are distinct?
    e. How many license plates could begin with AB and have all letters and digits distinct?

14.c.) $1 \cdot 1 \cdot 1 \cdot 1 \cdot 10 \cdot 10 \cdot 10 = 10^3 = 1000$

14.e.) $1 \cdot 1 \cdot 24 \cdot 23 \cdot 10 \cdot 9 \cdot 8 = 397,440$

17. a. How many integers are there from 1000 through 9999?
    b. How many odd integers are there from 1000 through 9999?
    c. How many integers from 1000 through 9999 have distinct digits?
    d. How many odd integers from 1000 through 9999 have distinct digits?
    e. What is the probability that a randomly chosen four-digit integer has distinct digits? has distinct digits and is odd?

17.a.) $\mathbf{9999 - 1000 + 1 = 9000}$

17.b.) $\frac{\mathbf{9000}}{\mathbf{2}} = \mathbf{4500}$

17.c.) $\mathbf{9 \cdot 9 \cdot 8 \cdot 7 = 4536}$

17.d.) $\mathbf{8 \cdot 8 \cdot 7 \cdot 5 = 2240}$

17.e.) $\frac{\mathbf{4536}}{\mathbf{9000}} = \frac{\mathbf{63}}{\mathbf{125}}$

$$\frac{\mathbf{2240}}{\mathbf{9000}} = \frac{\mathbf{56}}{\mathbf{225}}$$

5. a. How many five-digit integers (integers from 10,000 through 99,999) are divisible by 5?
   b. What is the probability that a five-digit integer chosen at random is divisible by 5?

5.a.) $\mathbf{10000 = 5 \cdot 2000 \ldots 99995 = 5 \cdot 19999}$

$\mathbf{19999 - 2000 + 1 = 18000}$ **integers are divisible by 5**

5.b.) Total possible five-digit integers from 10,000 to 99,999:

$\mathbf{99999 - 10000 + 1 = 90000}$

$$\frac{\mathbf{18000}}{\mathbf{90000}} = \frac{\mathbf{1}}{\mathbf{5}} = \mathbf{20\%}$$

24. a. How many integers from 1 through 1,000 are multiples of 2 or multiples of 9?
    b. Suppose an integer from 1 through 1,000 is chosen at random. Use the result of part (a) to find the probability that the integer is a multiple of 2 or a multiple of 9.
    c. How many integers from 1 through 1,000 are neither multiples of 2 nor multiples of 9?

24.a.) Let A = the set of all integers from 1 through 1000 that are multiples of 2

Let B = the set of all integers from 1 through 1000 that are multiples of 9

$\boldsymbol{A \cup B}$ **= the set of all integers from 1 through 1000 that are multiples of 2 or multiples of 9**

$\boldsymbol{A \cap B}$ **= the set of all integers from 1 through 1000 that are multiples of both 2 and 9**

= the set of all integers from 1 through 100 that are multiples of 18.

$$\boldsymbol{A = 2 \cdot 1, 2 \cdot 2, \ldots 2 \cdot 500}$$

$$\boldsymbol{|A| = 500}$$

$$\boldsymbol{B = 9 \cdot 1, 9 \cdot 2, \ldots 9 \cdot 111}$$

$$\boldsymbol{|B| = 111}$$

$$\boldsymbol{A \cap B = 18 \cdot 1, 18 \cdot 2, \ldots 18 \cdot 55}$$

$$\boldsymbol{|A \cap B| = 55}$$

$$\boldsymbol{|A \cup B| = 500 + 111 - 55 = 556}$$

24.b.) $\boldsymbol{\frac{556}{1000} = 55.6\%}$

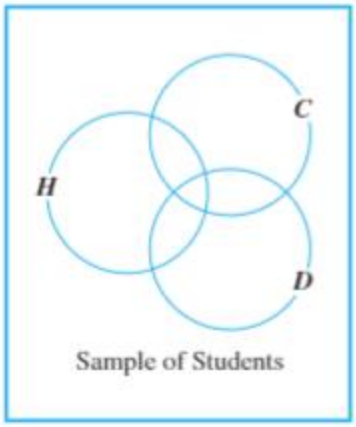
24.c.) $\boldsymbol{1000 - 556 = 444}$

33. A college conducted a survey to explore the academic interests and achievements of its students. It asked students to place checks beside the numbers of all the statements that were true of them. Statement #1 was "I was on the honor roll last term," statement #2 was "I belong to an academic club, such as the math club or the Spanish club," and statement #3 was "I am majoring in at least two subjects." Out of a sample of 100 students, 28 checked #1, 26 checked #2, and 14 checked #3, 8 checked both #1 and #2, 4 checked both #1 and #3, 3 checked both #2 and #3, and 2 checked all three statements.

a. How many students checked at least one of the statements?

b. How many students checked none of the statements?

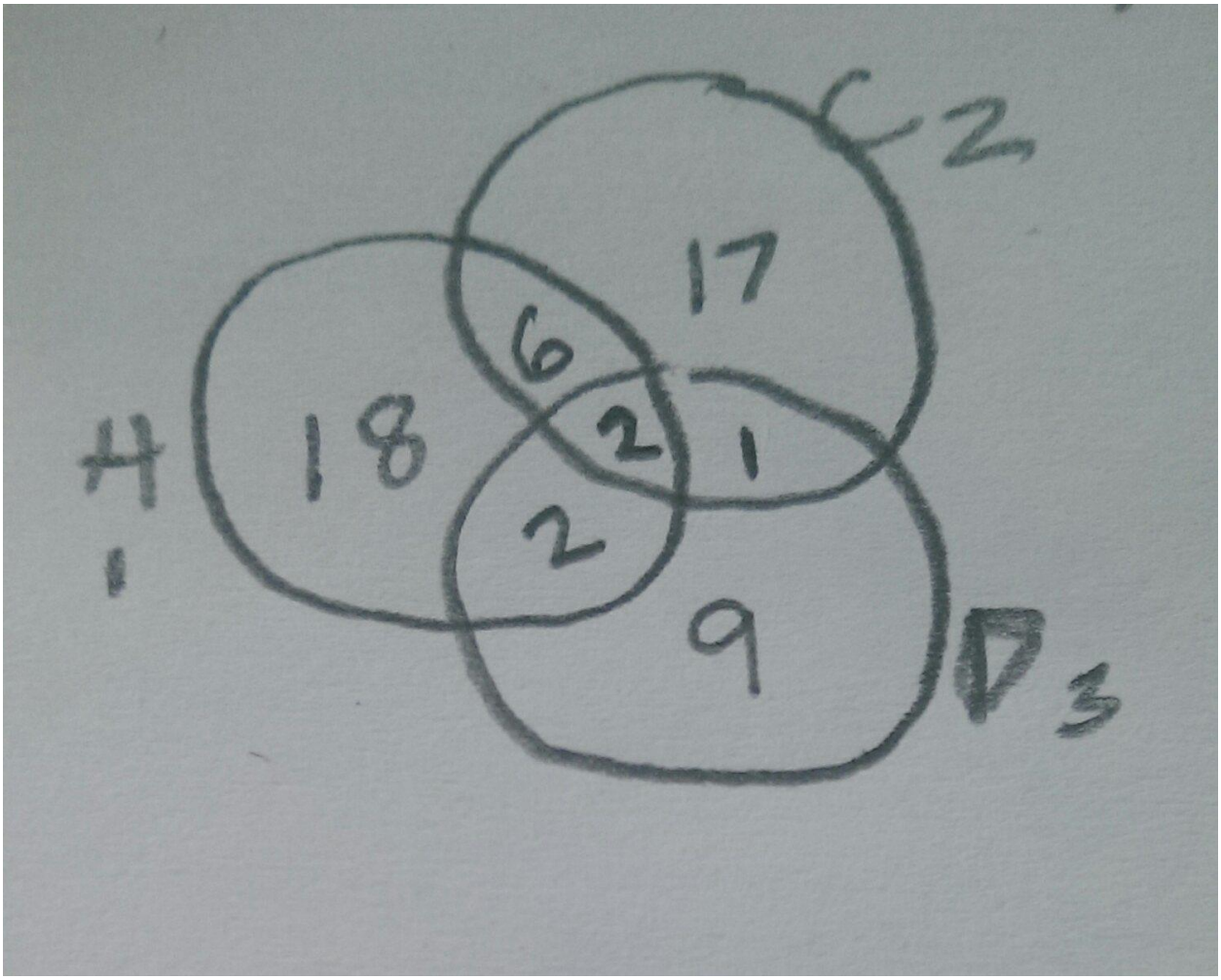
c. Let H be the set of students who checked #1, C the set of students who checked #2, and D the set of students who checked #3. Fill in the numbers for all eight regions of the diagram below.



d. How many students checked #1 and #2 but not #3?

e. How many students checked #2 and #3 but not #1?

f. How many students checked #2 but neither of the other two?



33.e.) 1

33.f.) 17