1) In a school of 320 students, 85 students are in the band, 200 students are on sports teams, and 60 students participate in both activities. How many students are involved in either band or sports? ANS: 225

2) A veterinarian surveys 26 of his patrons. He discovers that 14 have dogs, 10 have cats, and 5 have fish. Four have dogs and cats, 3 have dogs and fish, and one has a cat and fish. If no one has all three kinds of pets, how many patrons have none of these pets? ANS: 5

3) A guidance counselor is planning schedules for 30 students. Sixteen students say they want to take French, 16 want to take Spanish, and 11 want to take Latin. Five say they want to take both French and Latin, and of these, 3 wanted to take Spanish as well. Five want only Latin, and 8 want only Spanish. How many students want French only? ANS: 7

4) Consider the following deductive argument:
Premise 1: Everyone who has blood type AB negative works at a bakery.
Premise 2: Hobbie has blood type AB negative.
Conclusion: Therefore, Hobbie must work at a bakery.

(a) Determine whether the argument is valid or invalid. Explain your answer using a Venn diagram.

The argument is valid. Hobbie has blood type AB negative, so he is in the set of people with blood type AB negative. By the first premise, he must work at a bakery. So the conclusion follows necessarily from the premises.

(b) If the argument is valid, is the argument sound?

No, the argument is not sound. For instance, I have 8 friends with blood type AB negative, only 3 of which work at bakeries.

5) Herman is shopping online for a car and found a car manufactured in Europe that supposedly gets 18 kilometers per liter. How many miles per gallon does Herman’s dream car get?

6) One pair of jeans costs $80.00, and is being discounted by 45%. Another pair costs $55.00 and is being discounted by 15%. After the discount, which pair of jeans costs less?

ANS: 
- $80.00 – (45% * $80.00)- $44
- $55.00 – (15% * $55.00)- $46.75

7) Of the total land in Utah, approximately 25% is arable land;
- Of the arable land, one-fifth is developed with houses;
- Of the remaining arable land, 50% is open space;
- The rest of the arable land is farmland. Given the above information, determine how much of the total land in Utah is farmland. 

ANS: 10%

8) In the math department, there are 60 graduate students and 200 undergraduate students. Assuming there are no other students besides graduates and undergraduates, what percentage of math students are graduate students? Which is the relative difference between graduates and undergraduates? 

ANS: Percentage: 60/260 = 0.23 = 23%

Absolute difference = 140 students

Relative difference = 140/200 = 0.7 = 70%

9) The price of a pound of carrots is $2.00, which is 20% less than the price of a pound of leeks. What is the price of leeks.

ANS: $2.00 = 80% * LEEKS

LEEKS = $2.00/(80%) = $2.00/0.8 = $2.50

10) Let A be the set of animals that can fly (naturally, by which it is meant that A doesn’t include animals that fly in airplanes or spaceships) and let B be the set of animals that can swim. 

(a) What is the relationship between A and B? That is, are A and B overlapping, are A and B disjoint, or is one a subset of the other? 

(b) Draw a Venn diagram to describe the relationship between A and B.

11) Suppose there are 30 different salads at a salad bar. Further suppose that 16 of them have cabbage, 19 of them have tomatoes, 11 of them have spinach, 10 of them have both cabbage and tomatoes, 8 of them have both tomatoes and spinach, 2 of them have all three, and 1 of them is a salad that only has cabbage and spinach. How many of the salads have tomatoes, but not cabbage?

12) For the following deductive arguments, deduce whether or they are valid or invalid and explain either in words or with a Venn diagram. For valid arguments, decide whether
or not the argument is sound.

(a) Everyone who watches television eats tv dinners. Alice does not watch television, so Alice does not eat tv dinners.

(b) Everyone who watches television eats tv dinners. Alice does not eat tv dinners, so Alice does not watch television.

13) The price of gas at a certain gas station is $2.79 per gallon. How much is the price of gas in pesos per liter? (Assume that 1 peso = 8.99 cents and that 1 gallon = 3.785 liters.)

14) If the number of apples in Marcie’s orchard increased by 4% in May and by 8% in June, what was the percent increase in the number of apples over the months May and June?

15) Six years ago, the price of gas was as low as $1.09 per gallon. The price right now is around $2.79 per gallon. What is the absolute change in price over the last six years? What is the relative change in price over the last six years?

16) Among Benjamin Franklin’s inventions are the lightning rod, the Franklin Stove, and the carriage odometer, none of which he patented. In an old survey of 105 people, it was found that:

56 people had a Franklin Stove
70 people had a lightning rod
40 people had a carriage odometer
30 people had a lightning rod and a carriage odometer
25 people had a lightning rod and a Franklin Stove
15 people had a carriage odometer and a Franklin Stove
8 people had all three

Draw a Venn diagram to describe this survey and answer the following questions:

(a) How many people have none of these three of Benjamin Franklin’s inventions?

(b) How many people own a lightning rod or a Franklin Stove?

(c) How many people only have a carriage odometer?