1. 36 customers of a florist shop were interviewed. Most of them bought one or more of the following flowers: roses, tulips and orchids. The following information was recorded:

   15 bought roses,
   12 bought tulips,
   23 bought orchids.
   6 bought roses and tulips,
   7 bought tulips and orchids,
   8 bought roses and orchids.
   2 did not buy anything,
   whereas x customers bought all three flowers.

   a) Calculate the value of x using Venn diagram.
   b) Calculate the number of customers who bought:
      i)   Only one type of flower
      ii) Only orchids
      iii) At least 2 types of flowers

2. In a sewing kit, there are 6 bundles of thread of different colors, 3 needles, 7 blue buttons and 8 green buttons. In how many ways can a person choose one of the bundles of thread, one of the needles, one of the green buttons and one of the blue buttons?

3. How many three-digit numbers greater than 350 can be formed by using digits 0,1,2,3,4,5 and 6, if each digit can be used only once?

4. A student has to answer 15 out of 20 questions in Mathematics Placement Test.
   a) How many choices he has?
   b) How many choices if he must answer the first two questions?
   c) How many choices if he must answer the first or second question but not both?

5. Four married couples have bought 8 seats in the same row for a concert. In how many different ways can they be seated
   a) If there is no restriction?
   b) If each couple is to sit together?
   c) If all the men sit together to the right of all the women?

6. A stationery bag contains five pencils, two erasers and five pens. If three items are randomly selected from the bag (without replacement), what is the probability that
   a) One pencil, one eraser and one pen are selected?
   b) The three items selected are either all pencils or all pens?
   c) None of the pencils is selected?

7. Answer Question 6, if the items are selected with replacement.

8. During the university open day, there are twelve male staffs and twenty female staffs on duty at two counters. Half of the male staffs and forty percent of the female staffs work at the administration counter. Find the probability that a staff chosen at random is
   a) a staff that is not working at the administration counter.
   b) a male staff that is on duty at the administration counter.
   c) a female staff or a staff on duty at the administration counter.

9. A group of friends, four boys and four girls make a decision to watch a movie at a cinema. They made a reservation of eight seats in a row. Find the probability that
   a) all the boys sit together.
   b) all the girls sit together on the right side of the boys.
   c) the girls and the boys sit in alternate seats.

10. Four letters are chosen at random from the word UNIVERSITY. What is the probability that
    a) exactly two letters "I" are chosen?
    b) none of the vowels are chosen?
    c) at least three vowels are chosen?

11. Two unbiased dice are tossed. Find the probability that
    a) the sum of the two numbers on the uppermost faces is at most 6.
    b) the sum of the two numbers on the uppermost faces is not odd.
    c) the difference between the two numbers on the uppermost faces is at least 3.

12. A total of 150 MMU students registered for foreign language classes: Japanese, French and Spanish. It is found that

    > 96 students learn Japanese,
    > 20 students learn Japanese and French,
    > 17 students learn French and Spanish,
    > 12 students learn Japanese and Spanish,
    > 12 students learn all three languages,
    > x students learn only French,
    > y students learn only Spanish.

    The number of students who learn Japanese is three times bigger than the number of students who learn French.

a) Represent the above information in a Venn diagram and calculate the values x and y.
b) Find the number of students who learn exactly one of the three languages
c) One student is selected randomly from the group of MMU students who registered for foreign language classes. Find the probability that the student:
    i.   learn French or Spanish but not learn Japanese
    ii.   learn at least two types of foreign languages.
d) Two students are selected randomly from the group who learn more than one foreign languages. Find the probability that both students learn French and Spanish.
e) Three students who learn only Japanese language and three students who learn only French language are chosen randomly to attend a seminar. They sit in a row of six seats. Find the probability that
    i.   the three students who learn French sit together
    ii.   the students who learn French and the students who learn Japanese sit in alternate seats

13. During the Statisticians Club committee election, each member must elect a committee of four people from candidates of five men and five women. Find the probability that the committee will have
    a) two men and two women.
    b) at least two women.
    c) one woman and three men if a certain man must be the president.

14. 250 married couples were asked whether or not they would apologize to their spouses after they have an argument. Their responses are recorded below.

Foundation	Would Apologize?	
	Yes (Y)	No (N)
Male (M)	175	75
Female (F)	80	170

a) If a person is selected at random from these married couples, find the probability of the following events.
    i)   "Yes"
    ii)   "Yes given Female"
    iii)   "Male and No"
    iv)   "Yes or Female"

b) Are the events "Male" and "Yes" independent?

Answer:

1) a) 5   b) i) 23   ii) 13   iii) 11

2) 1008

3) 99

4) a) 15504   b) 8568   c) 6120

5) a) 40320   b) 384   c) 576

6) a) $\dfrac{5}{22}$ b) $\dfrac{1}{11}$ c) $\dfrac{7}{44}$

7) a) $\dfrac{25}{144}$ b) $\dfrac{125}{864}$ c) $\dfrac{343}{1728}$

8) a) $\dfrac{9}{16}$ b) $\dfrac{3}{16}$ c) $\dfrac{13}{16}$

9) a) $\dfrac{2}{35}$ b) $\dfrac{1}{70}$ c) $\dfrac{1}{35}$

10) a) $\dfrac{2}{15}$ b) $\dfrac{1}{14}$ c) $\dfrac{5}{42}$

11) a) $\dfrac{5}{12}$ b) $\dfrac{1}{2}$ c) $\dfrac{1}{3}$

12) a) $x = 7, y = 42$

    b) 125

    c) i) 0.36   ii) 0.167

    d) 0.68

    e) i) 0.2   ii) 0.1

13) a) $\dfrac{10}{21}$ b) $\dfrac{31}{42}$ c) $\dfrac{1}{7}$

14) a) i) $\dfrac{51}{100}$ ii) $\dfrac{8}{25}$ iii) $\dfrac{3}{20}$ iv) $\dfrac{17}{20}$

    b) Not independent