1) A doctor did 500 surgeries 480 of them was succeeded. What is the probability of surgery's success? $\frac{24}{25}$

2) In a lantern factory, It has been found that among 1000 lantern there are 50 bad ones. What is the probability of having a good lantern? $\frac{19}{20}$

3) If probability of Ahmed's success is $\frac{5}{8}$, what is the probability of his failed? $\frac{3}{8}$

4) If probability of Ahmed's success is $\frac{5}{8}$, and the probability of Ahmed's and Mohamed's success is $\frac{1}{8}$, what is the probability of Ahmed's success and Mohamed's failed? $\frac{1}{2}$

5) If probability of Ahmed's success is $\frac{1}{4}$, the probability of Mohamed's failed is $\frac{1}{3}$, and probability of Ahmed's and Mohamed's success is $\frac{1}{6}$ what is the probability of at least one of them is success? $\frac{3}{4}$

6) Tossing a fair coin twice. If A is an event of having a head in the first toss, B is an event of having a tail in the first toss, and C is an event of having at least one head. Find each of the following:

a. $P(A)$ $\frac{1}{2}$ b. $P(B)$ $\frac{1}{2}$ c. $P(C)$ $\frac{3}{4}$ d. $P(A \cap B)$ 0

e. $P(A \cup B)$ 1 f. $P(\overline{A \cup B})$ 0 g. $P(B \cap \bar{C})$ $\frac{1}{4}$ h. $P(\bar{B} \cup \bar{C})$ $\frac{3}{4}$

7) If A, B are events such that:

$$P(A) = \frac{1}{5} \qquad P(B) = \frac{2}{5} \qquad P(A \cup B) = \frac{1}{2}$$

Calculate each of the following:

a. $P(A \cap B)$ $\frac{1}{10}$ b. $P(A \cap \bar{B})$ $\frac{1}{10}$ c. $P(\bar{A} \cap \bar{B})$ $\frac{1}{2}$

8) If A, B are events such that:

$$P(A) = \frac{1}{2} \qquad P(B) = \frac{5}{8} \qquad P(A \cup B) = \frac{3}{4}$$

Calculate each of the following:

a. $P(A \cap B)$ $\frac{3}{8}$ b. $P(\bar{A} \cap \bar{B})$ $\frac{1}{4}$ c. $P(\bar{A} \cup \bar{B})$ $\frac{5}{8}$

d. $P(B \cap \bar{A})$ $\frac{1}{4}$ e. $P(\bar{B} \cap A)$ $\frac{1}{8}$ f. $P(A|B)$ $\frac{3}{5}$

g. $P(B|\bar{A})$ $\frac{1}{2}$

h. Does A and B independent events? Why?

No, $P(A|B) \neq P(A)$ or $P(A \cap B) \neq P(A)P(B)$

9) If A, B are events such that:

$$P(A) = 0.2 \qquad P(A \cup B) = 0.7$$

Calculate $P(B)$ in each following case:

a. A, B are independent events. 0.625

b. A, B are disjoint events (mutually exclusive events). 0.5

c. $A \subseteq B$. 0.7

10) If C, D are events such that:

$$P(C) = \frac{1}{3} \qquad P(D|C) = \frac{1}{2} \qquad P(C \cup D) = \frac{4}{5}$$

Does C and D independent events? Explain. No, $P(D|C) \neq P(D)$ or $P(C \cap D) \neq P(C)P(D)$

11) For each sentence put (T) as true or (F) as false:

a. The probability that Maram passes STAT-101 course is 0.7, the probability that she fails in the course is 0.2 (F)

b. If A, B are events such that: $P(A) = 0.3, P(B) = 0.4, P(A \cap B) = 0.2$, then:

i. $P(A \cup B) = 0.7$ (F)

ii. $P(\bar{A} \cap \bar{B}) = 0.5$ (T)

iii. $P(\bar{A}|\bar{B}) = 0.65$ (F)

iv. $P(\bar{A} \cup \bar{B}) = 0.8$ (T)

c. If A, B are independent events then: $P(A \cup B) = P(A) + P(B)P(\bar{A})$. (T)

12) Fill the blanks:

a. If $P(A \cup B) = 0.85$, then $P(\bar{A} \cap \bar{B}) =$ 0.15

b. If $P(A) = 0.3, P(A \cap B) = 0.2$, then $P(A \cap \bar{B}) =$ 0.1

c. A, B are mutually exclusive event if and only if $A \cap B = \emptyset$

13) If A, B are events such that:

$$P(B) = \frac{2}{3} \qquad P(A \cap B) = \frac{1}{2} \qquad P(A \cap \bar{B}) = \frac{1}{4}$$

Calculate each of the following:

a. $P(A)$ $\frac{3}{4}$ b. $P(\overline{A \cap B})$ $\frac{1}{2}$ c. $P(\bar{A} \cap \bar{B})$ $\frac{1}{12}$

14) If *A*, *B* are events such that:

$$P(A) = t \qquad P(A \cup B) = \frac{1}{2} \qquad P(B) = \frac{1}{3}$$

Calculate the value of *t* in each following case:

a. *A*, *B* are independent events. $t = \frac{1}{4}$

b. *A*, *B* are disjoint events (mutually exclusive events). $t = \frac{1}{6}$

15) Rolling a weighted die such that the probability of any event is proportional to the number that appearing on the top.

a. What is the probability of having an even number? $\frac{4}{7}$

b. What is the probability of having a number greater that 4? $\frac{11}{21}$

16) Rolling two different fair dice. What is the probability of having sum equal to 4 or 9? $\frac{7}{36}$

17) Selecting randomly one card from the playing card. What is the probability that the card has number 3 or picture? $\frac{4}{13}$

18) An integer number was randomly selected from 1 to 50 such that each number has the same chance of appearance. What is the probability that the selected number is 4 of its multiples? $\frac{6}{25}$

19) Two cards were selected randomly from the playing cards. What is the probability that the cards were black? $\frac{25}{102}$

20) If probability of Hind's success is $\frac{1}{3}$, and the probability of Hind's and Mona's success is $\frac{1}{4}$, what is the probability of Mona's success given that Hind was success? $\frac{3}{4}$

21) A family has two kids. What is the probability that both kids are boys given:

a. The oldest is a boy. $\frac{1}{2}$

b. At least one of the kids is boy. $\frac{1}{3}$

22) If the probability of Mohamed's hitting target is $\frac{3}{4}$, and the probability of Ahmed's hitting the same target is $\frac{1}{3}$, what is the probability of each following events:

a. Mohamed does not hit the target. $\frac{1}{4}$

b. Ahmed does not hit the target. $\frac{2}{3}$

c. Both hit the target. $\frac{1}{4}$

d. One at least hit the target. $\frac{5}{6}$

e. Mohamed hits the target and Ahmed do not. $\frac{1}{2}$

f. Both do not hit the target. $\frac{3}{4}$

23) A box contains 10 red balls and 20 white balls. Two balls were selected randomly one after the other. Find the probability that both balls were white if:

a. Replacement was not allowed. $\frac{38}{87}$

b. Replacement was allowed. $\frac{4}{9}$

24) A box contains 10 red balls and 20 white balls. Four balls were selected randomly. Find the probability of having 3 red balls and one white? 0.088

25) A box contains 10 red balls and 20 white balls. Four balls were selected randomly. Find the probability of having 4 different colors? 0

26) A box has 15 apples, 10 were good and 5 were bad. If 3 apples were randomly selected at the same time:

a. What is the probability that all selected apples were good? $\frac{24}{91}$

b. What is the probability that all selected apples were bad? $\frac{2}{91}$

c. What is the probability that two of selected apples were good? $\frac{9}{42}$

d. What is the probability that at least two of selected apples were good? $\frac{87}{182}$

27) A factory has 3 types of machines I, II, III, the machine I produces 20% of the factory productions, machine II produces 30% of the factory productions, and machine III produces 50% of factory production. The percentage of the bad products for the 3 machines are 2%, 3%, 4%, respectively. If one product was selected randomly from the factory production:

a. What is the probability that the selected product was bad? 0.033

b. If the selected product was bad, what is the probability that the selected product was from machine II? 0.273

28) Two boxes, the first one contains 4 white balls and 6 black balls. The other one contains 8 white balls and 3 black balls. If one of the boxes was selected randomly and one ball was selected randomly:

a. What is the probability that the selected ball was black? 0.436

b. If the selected ball was black, what is the probability that ball was from the first box? 0.688