A4) We have the weighted die .Let X be the random variable denoting the number of dots.

a) X can take 6 values with the corresponding probabilities

X: 1 2 3 4 5 6

P(X): 0.1 0.1 0.1 0.1 0.1 0.5

Now we need E(X).

E(X)=

=1\*0.1+2\*0.1+3\*0.1+4\*0.4+5\*5\*0.1+6\*0.5

=4.5

b) Here we need E()

=

=(1+4+9+16+25)\*0.1+36\*0.5

=23.5

A10)

4 dice are rolled

a) We need the probability that no one shows 6.

The required probability is the probability that there are 5 numbers (1,2,3,4,5) on each of the die and the probability of that is (5/6)^4=625/1296 =0.4822

b)We need that one and only one lands up with 6 .

This means that there is 6 on one die and any other number on all others.

6 can be one the 1st, 2nd , 3rd or 4th die .

The required probability is : (1/6)\*(125/216)\*4=0.3858

We are multiplying by 4 because there can be 4 cases as explained above.

A20)



a) we know, 2!= 2,

Using the stirling approximation, we put n=2 and get 2!=1.919

There is an absolute difference of 0.081 and the percentage error of 4.05

b) When n=5 , 5! =120 (5\*4\*3\*2\*1)

Using stirling’s formula : n!=118.02

There is an absolute difference of 1.981 and the percentage error of 1.65

c)when n= 10, 10! =3628800

Using the stirling approximation, we put n=10 and get 10!=3598696

There is an absolute difference of 30104.38 and percentage error of 0.83

d) When n=20, 20!= 2.4329E+18

Using the stirling approximation, we put n=20 and get 20!= 2.42279E+18

There is an absolute difference of 1.0115E+16 and percentage error of 0.415

Thus we see that the percentage error decreases when n increases.

28)In one deck of cards, we have 52 cards so in two decks we have a total of 104 cards.

a)Probability that the first card dealt is an ace is

8/104 =1/13,as there are 8 aces in two decks.

b)Probability that second card dealt is a club.

There are 26 club cards.

The required probability is :P(2nd card is club and 1st was club)+P(2nd card is club and 1st was not a club ) =

c)Let A be the event first card is an ace and B be the event that second card is a club.

Then if P(A and B)=P(A)\*P(B), we say that the events A and B are statistically independent otherwise not.

P(A)=1/13 and P(B)=1/4.

Now P( A and B)= (

P(A)\*P(B)=0.019 and so since they are equal , they are independent .

d)What we need here is P(A and B ) , where A and B are the events defined in c).

P(A and B)= 

We may have all aces except the ace of club in the first card and so all 26 clubs available for selection in the second draw while in the other case, we may have any ace from the clubs and thus only 25 cards remaining for selection in the second draw.