#include<iostream.h>

#include<conio.h>

#include<math.h>

#include<string.h>

double factorial(double g)

{

int i;

for(i=g-1;i>1;i--)

g\*=i;

return g;

}

void main()

{

clrscr();

float a[30],b[30],c[30],d[30],e[30];

int i,j,k,l,m;

float sum=0;

double n;

float Ex,var,Ex2;

l1: cout<<"Enter the size of the population and it should more than 5 but not more than 30\n";

cin>>n;

cout<<"\n";

if(n>5 && n<30)

{

cout<<"Enter the age of person in years and months\n";

for(i=1;i<=n;i++)

cin>>a[i];

cout<<" The mean of the data collected i.e. E(x):";

for(i=1;i<=n;i++)

sum=sum+a[i];

Ex=(sum/n);

cout<<"\t"<<Ex;

cout<<"\n The variance of the data collected i.e var(x):";

sum=0;

for(i=1;i<=n;i++)

sum=sum+(a[i]\*a[i]);

Ex2=(sum/n);

var=Ex2-(Ex\*Ex);

cout<<"\t"<<var;

cout<<"\n The standard deviation for the data is: \t";

cout<<pow(var,.5);

cout<<"\n\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\n";

cout<<"For both sampling with and without replacement,group of 5 elements is taken\n";

cout<<"\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\n";

cout<<" For sampling,with replacement for the given data:\n";

cout<<"The variance for sample with replacement is given by the formula\n var(x)/n ";

cout<<"\n So variance with replacement using the formula should be: \t"<< var/5;

for(i=1,k=1,l=1,m=1,j=1;i<=n;i++,k++,l++,m++,j++)

{

b[j]=a[i];

c[k]=a[i];

d[l]=a[i];

e[m]=a[i];

}

double sum2=0;

double sum3=0;

double sum4=0;

double sum5=0;

for(i=1;i<=n;i++)

{

for(j=1;j<=n;j++)

{

for(k=1;k<=n;k++)

{

for(l=1;l<=n;l++)

{

for(m=1;m<=n;m++)

{

sum2=a[i]+b[j]+c[k]+d[l]+e[m];

sum3=sum2+sum3;

sum4=sum2/5;

sum5=sum5+(sum4\*sum4);

}

}

}

}

}

sum3=sum3/5;

double smean=0;

double svar=0;

smean=sum3/pow(n,5);

cout<<"\n The sample mean for with replacement is: \t"<< smean;

sum5=sum5/pow(n,5);

svar=sum5-(smean\*smean);

cout<<"\n The variance of data with replacement is: \t"<< svar;

cout<<"\n The standard deviation is: \t"<< pow(svar,.5);

cout<<"\n\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\n";

cout<<"For sampling, without replacement for the given data:\n";

cout<<"The variance for sample without replacement is given by formula\n (N-1)\*var(x)/n\*(N-n)\n";

float q;

q=((n-5)\*var)/((n-1)\*5);

cout<<"So the variance without replacement using the formula should be: \t"<<q;

double sum6=0;

double sum7=0;

double sum8=0;

double sum9=0;

for(i=1;i<=n;i++)

{

int curr\_i=i;

for(j=1;j<=n;j++)

{

int curr\_j=j;

if(j!=curr\_i)

{

for(k=1;k<=n;k++)

{

int curr\_k=k;

if(( k!=curr\_i) && (k!=curr\_j))

{

for(l=1;l<=n;l++)

{

int curr\_l=l;

if((l!=curr\_i) && (l!=curr\_j) && (l!=curr\_k))

{

for(m=1;m<=n;m++)

{

if((m!=curr\_i) && (m!=curr\_j) && (m!=curr\_k) && (m!=curr\_l))

{

sum6=a[i]+b[j]+c[k]+d[l]+e[m];

sum7=sum7+sum6;

sum8=sum6/5;

sum9=sum9+(sum8\*sum8);

}

}

}

}

}

}

}

}

}

double smean1=0;

double svar1=0;

double r;

r=factorial(n)/factorial(n-5);//permutation

smean1=sum7/(5\*r);

cout<<" The sample mean for without replacement is:\t"<<smean1;

sum9=sum9/r;

svar1=sum9-(smean1\*smean1);

cout<<"\n The variance of data without replacement is:\t"<<svar1;

cout<<"\n The standard deviation is:\t"<< pow(svar1,.5);

}

else

{

cout<<"the number you entered is not matching the programer's requirement\n";

char ch;

cout<<"\n Do you wish to restart the program? (y or n)\n";

cin>>ch;

if(ch=='y' || ch=='Y')

goto l1;

else

cout<<"exiting\n";

}

getch();

}