

โปรแกรมการคำนวณแบบทดสอบ A

```

*****
*           Program by Waachai Tongkai           *
*           6/11/92   21:00                       *
*           update by WANKEE 12/5/94             *
*****

cls

rowdata = 1

? "           PROGRAM NORMAL DISTRIBUTION TEST"
? "           ***   WANKEE   ****"
?
?"PLEASE INPUT VALUE OF PARAMETER"
?
input "Size of Sample N : ",n
nn = n+1           'increment for compute Astar
?
?
input "Data file name   : ",filename'
dim x(rowdata,nn),z(rowdata,nn),fz(rowdata,nn),DnAdd(rowdata,nn),DnSub(rowdata,nn)
gosub readfi
gosub main1A
add051 = add05 : add101 = add10 : Err051 = Err05
Err101 = Err10 : add05 = 0 : add10 = 0 : G05 = 0 :G10 = 0
gosub main1B
add052 = add05 : add102 = add10 : Err052 = Err05
Err102 = Err10 : add05 = 0 : add10 = 0
gosub main1C
add053 = add05 : add103 = add10 : Err053 = Err05 : Err103 = Err10
gosub report1
? "           End Program"
end

***** A* *****

main1A:
for r = 1 to rowdata
gosub normal
gosub computeAStar

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gosub countcritical1
next r
gosub proboferror
return
'***** Dn, G *****
main1B:
for r = 1 to rowdata
gosub normal
gosub computeDn
gosub countcritical2
next r
gosub proboferror
return
'***** Gn1 *****
main1C:
for r = 1 to rowdata
gosub normal
gosub computeGn1
gosub countcritical3
next r
gosub proboferror
return

'***** end main *****
'*****
'          SUB PROGRAM          *
'*****
readfi:
open "i",#1,finame'
for r = 1 to rowdata
for c = 1 to n
input #1,x(r,c)
        locate 14,1 : ? using "Read Data ROW = ### COL = ## X = ###.####";r,c,x(r,c)
next c
next r

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close
'sortdata:
?:?:?"Please wait for sort data"
?
for r = 1 to rowdata
    for i = 1 to n-1
for j = 1 to n-1
    if x(r,j) > x(r,j+1) then swap x(r,j),x(r,j+1)
next j,i
'for check same data 3 value
same = 1
temp = x(r,1)
for i = 2 to n
if temp = x(r,i) then same = same+1 else temp = x(r,i)
next i
if same > 2 then ??:? "SORRY DATA CAN NOT USE (3 TIES)" : END
next r
return
'***** step 4-7 *****
normal:
'value of r from main program
locate 15,1 : ? using "Compute data group ###":r
ze1 = 0
for c = 1 to n
ze1 = ze1 + x(r,c)
next c
zeta1 = ze1/n
ze2 = 0
for c = 1 to n
ze2 = ze2 + ( x(r,c)-zeta1 )^2
next c
zeta2 = sqr(ze2/(n-1))
for c = 1 to n
z(r,c) = (x(r,c)-zeta1)/zeta2
next c

```

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'***** sor' data ***** (5)
'sort for z(r,j) move to after read data for check 3 ties
'***** compute P(Z < Zi) **** (6), (7)
for c = 1 to n
az = abs(z(r,c))
t1 = 1/(1+0.2316419*az)
      dz = 0.3989423 * exp( -1 * (z(r,c) * z(r,c)) / 2)
if z(r,c) > 0 then
      fz(r,c) = 1 - dz*t1*(((1.330274*t1-1.821256)*t1+1.781478)*t1-0.3565688)*t1+0.3198815)
end if
if z(r,c) <= 0 then
      fz(r,c) = dz*t1*(((1.330274*t1-1.821256)*t1+1.781478)*t1-0.3565688)*t1+0.3198815)
end if
      next c
return
'***** (11)
proboferror:
Err05 = Add05/rowdata
Err10 = Add10/rowdata
errg05 =g05/rowdata
errg10 =g10/rowdata
erg05 =gadj05/rowdata
erg10 =gadj10/rowdata
return
'*****
'*          Sub 1-A          *
'*****
' compute A*          ***** (8)
computeAStar:
Astar = 0
for c = 1 to n
fz(r,0) = -1 * fz(r,1)
fz(r,n+1) = 2-fz(r,n)
AStar = Astar + ( ( fz(r,c+1)-fz(r,c-1))/2 ) - (1/n) )^2
next c

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```
AStar = AStar * .5
```

```
return
```

```
'***** count critical-point ***** (9)
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```
countcritical1:
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```
if n = 5 then
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    if AStar > .026 then Add05 = Add05 + 1
```

```
    if AStar > .022 then Add10 = Add10 + 1
```

```
end if
```

```
if n = 10 then
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```
    if AStar > .025 then Add05 = Add05 + 1
```

```
    if AStar > .021 then Add10 = Add10 + 1
```

```
end if
```

```
if n = 20 then
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```
    if AStar > .016 then Add05 = Add05 + 1
```

```
    if AStar > .013 then Add10 = Add10 + 1
```

```
end if
```

```
return
```

```
'***** Report to Display *****
```

```
report1:
```

```
cls
```

```
? "          NORMAL DISTRIBUTION : UNKNOWN PARAMETER"
```

```
? "          Gn1
```

```
?
```

```
? "Sample Size N = ";n;"Parameter Z1 = ";zeta1;" , Z2 = ";zeta2
```

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?
```

```
? "          "          .05          .10"
```

```
? "
```

```
? using "Critical Value  AStar  ###          ###          ";Add051,Add101
```

```
? using "Prob of Error  AStar ###.####          ###.####          ";Err051,Err101
```

```
? "
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```
? using "Critical Value  DnMAX  ###          ###          ";Add052,Add102
```

```
? using "Prob of Error  DnMax ###.####          ###.####          ";Err052,Err102
```

```
? "
```

```
? using "Critical Value  G          ###          ###          ";G05,g10
```

```

'? using "Prob of Error  G   ***.****   ***.**** ";ErrG05,errg10
'?
'? using "Critical Value  Gn1   ***   ***   ";Add053,Add103
'? using "Prob of Error  Gn1   ***.****   ***.**** ";Err053,Err103
if add053 =1 then ? "reject Ho (sig .05)" else ?"accept Ho (sig .05)"
if add103 =1 then ? "reject Ho (sig .10)" else ?"accept Ho (sig .10)"
return

'*****
'*           Sub 1-B           *
'*****
' compute DnMax, DnMin (G) ***** (8)
computeDn:
MinDnAdd = 9999 : MaxDnAdd = 0 : MinDnSub = 9999 : MaxDnSub = 0 : Dn = 0 : G=0
for c = 1 to n
  DnAdd(r,c) = ( c/n - fz(r,c) )
  DnSub(r,c) = ( fz(r,c) - (c-1)/n )
  if DnAdd(r,c) > MaxDnAdd then MaxDnAdd = DnAdd(r,c)
  if DnSub(r,c) > MaxDnSub then MaxDnSub = DnSub(r,c)
  'if DnAdd(r,c) < MinDnAdd then MinDnAdd = DnAdd(r,c)
  'if DnSub(r,c) < MinDnSub then MinDnSub = DnSub(r,c)
next c
GAdd = MinDnAdd : GSub = MinDnSub
if MaxDnAdd > MaxDnSub then Dn = MaxDnAdd else Dn = MaxDnSub
if MaxDnAdd < MaxDnSub then G = MaxDnAdd else G = MaxDnSub
return
'***** count critical-point ***** (9)
countercritical2:
if n = 5 then
  if G > 0.242 then G05 = G05 + 1
  if G > 0.228 then G10 = G10 + 1
  if Dn > 0.337 then Add05 = Add05 + 1
  if Dn > 0.315 then Add10 = Add10 + 1
end if
if n = 10 then

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    if G > 0.184 then G05 = G05 + 1
    if G > 0.171 then G10 = G10 + 1
    if Dn > 0.258 then Add05 = Add05 + 1
    if Dn > 0.239 then Add10 = Add10 + 1
end if

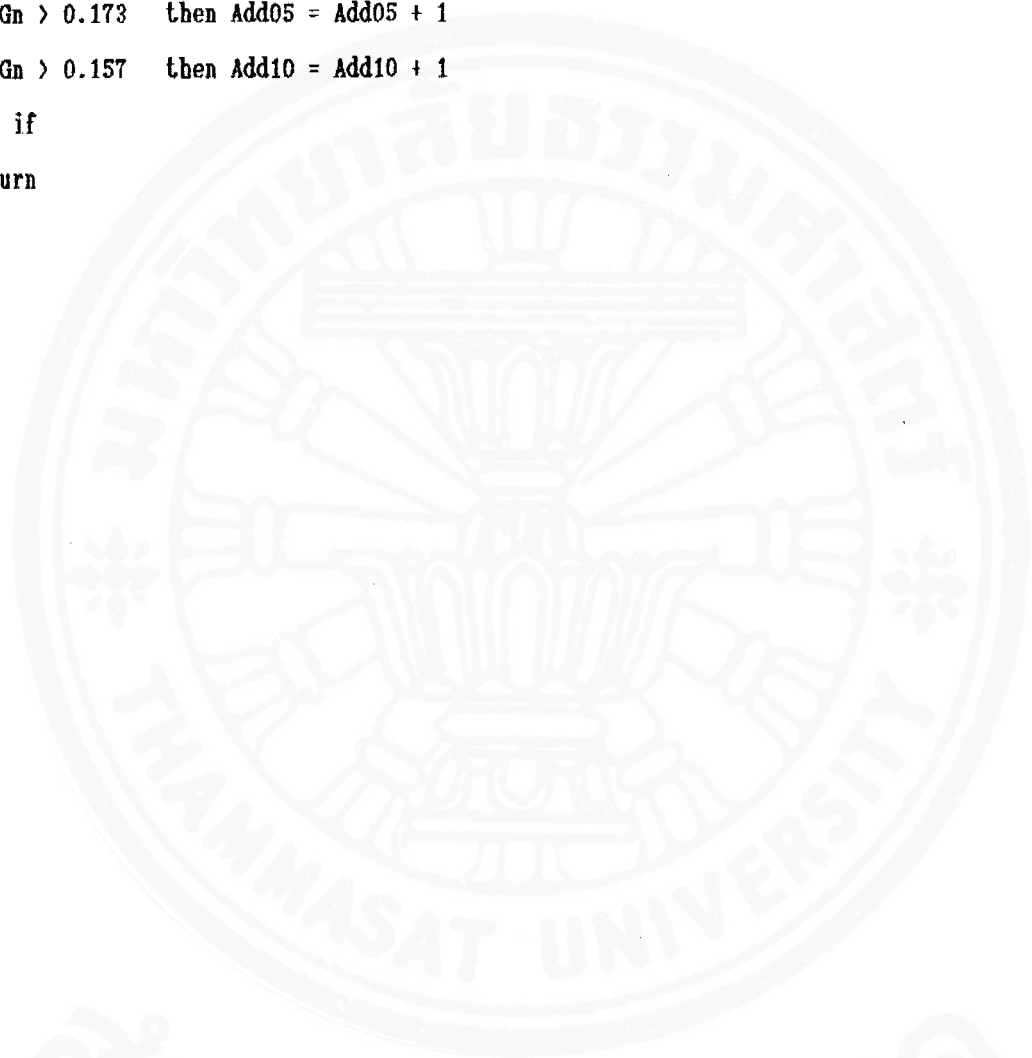
if n = 20 then
    if G > 0.135 then G05 = G05 + 1
    if G > 0.124 then G10 = G10 + 1
    if Dn > 0.190 then Add05 = Add05 + 1
    if Dn > 0.174 then Add10 = Add10 + 1
end if

return

'*****
'*                Sub 1-D                *
'*****
' compute DnAdd, DnSub ***** (8)
computeGn1:
MaxDnAdd = 0 : MaxDnSub = 0 : Dn = 0
for c = 1 to n
DnAdd(r,c) = abs( (c-1)/(n-1) - fz(r,c) )
DnSub(r,c) = abs( fz(r,c) - (c-1)/(n-1) )
if DnAdd(r,c) > MaxDnAdd then MaxDnAdd = DnAdd(r,c)
if DnSub(r,c) > MaxDnSub then MaxDnSub = DnSub(r,c)
next c
if MaxDnAdd > MaxDnSub then Dn = MaxDnAdd else Dn = MaxDnSub
Gn = Dn
return
'***** count critical-point ***** (9)
countcritical3:
if n = 5 then
if Gn > 0.282 then Add05 = Add05 + 1
if Gn > 0.249 then Add10 = Add10 + 1
end if
if n = 10 then

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if  $G_n > 0.227$  then  $Add05 = Add05 + 1$   
if  $G_n > 0.205$  then  $Add10 = Add10 + 1$   
end if  
if  $n = 20$  then  
if  $G_n > 0.173$  then  $Add05 = Add05 + 1$   
if  $G_n > 0.157$  then  $Add10 = Add10 + 1$   
end if  
return
```



สำนักหอสมุด

โปรแกรมการคำนวณแบบทดสอบ B

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*****
*          PROGRAM B-TEST FOR EXPONENTIAL DISTRIBUTION *
*          Program by Wannee Tanapaisarnkit           *
*          18/01/95   11:30                           *
*                                                     *
*****

cls
rowdata = 500

? "          PROGRAM B-TEST FOR EXPONENTIAL DISTRIBUTION"
? "          ****   WANNEE   ****"
?
input "Size of Sample N : ",n
?
?
input "Data file name   : ",filename'
input "distribution normal =1 ,expo =2",dist
dim x(rowdata,n),z(rowdata,n),fz(rowdata,n)
mn =0 : total = 0:add10 =0 :add05=0:acc05=0:acc10=0
err05=0 :err10=0
gosub readfi
for r=1 to rowdata
n1=0 :n2=0 :n3=0 :n4=0 :ffn1 = 0 :ffn2 = 0 : ffn3 = 0 : ffn4 =0
if dist = 1 then gosub normal else gosub expo
if n=5 then gosub count5
if n=10 then gosub count10
if n=20 then gosub count20
next r
gosub proboferror
gosub report1
? "          End Program"
end

***** end main *****)*****

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*****
*                               *
*                               *
*****
*****(1)

readfi:
open "i",#1,finame'
for r = 1 to rowdata
for c = 1 to n
input #1,x(r,c)
    locate 14,1 : ? using "Read Data ROW = ### COL = ## X = ###.####";r,c,x(r,c)
next c
next r
close
'sortdata:
?:?:?"Please wait for sort data"
?
for r = 1 to rowdata
    for i = 1 to n-1
for j = 1 to n-1
    if x(r,j) > x(r,j+1) then swap x(r,j),x(r,j+1)
next j,i
next r
return
'***** step 4-7 *****
normal:
'value of r from main program
locate 15,1 : ? using "Compute data group ###";r
ze1 = 0
for c = 1 to n
ze1 = ze1 + x(r,c)
next c

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zeta1 = ze1/n
      ze2 = 0
for c = 1 to n
ze2 = ze2 + ( x(r,c)-zeta1 )^2
next c
zeta2 = sqr(ze2/(n-1))
for c = 1 to n
z(r,c) = (x(r,c)-zeta1)/zeta2

'print "x,z",x(r,c),i,z(r,c)
next c
'***** sort data ***** (5)
'sort for z(r,j) move to after read data for check 3 ties
'***** compute P(Z < Zi) **** (6),(7)
for c = 1 to n
az = abs(z(r,c))
t1 = 1/(1+0.2316419*az)
      dz = 0.3989423 * exp( -1 * (z(r,c) * z(r,c)) / 2)
if z(r,c) > 0 then
      fz(r,c) = 1 - dz*t1*(((1.330274*t1-1.821256)*t1+1.781478)*t1-0.3565688)*t1+0.3198815)
end if
if z(r,c) <= 0 then
      fz(r,c) = dz*t1*(((1.330274*t1-1.821256)*t1+1.781478)*t1-0.3565688)*t1+0.3198815)
end if
'print "fz(r,c)",fz(r,c)
      next c
'print "mean,var",zeta1,zeta2
return
'***** (2)
expo:
mn = 0 :total =0
for c = 1 to n

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total = total + x(r,c)
next c
mn      = total/n
for c = 1 to n
    fz(r,c) =1-exp(-x(r,c)/mn)
'print "f(",c,")",f(c)
next c
'lprint "mean=",mn
return
***** (3)
count5:
'ffn1 = 0 :ffn2 = 0
for c =1 to n
    if fz(r,c) <.5 then n1 =n1+1
    if fz(r,c) > .5 and fz(r,c) < 1 then n2 =n2+1
next c
    ffn1 =n1/n
'lprint "ffn1 =",ffn1
    ffn2 =n2/n
'lprint "ffn2 =",ffn2
***** count critical-point ***** (4)
if (ffn1 < .872224 and ffn1 > .260634) and (ffn2 < .872224 and ffn2 > .260634)
    then acc10 else add10=add10+1
if (ffn1 < .905610 and ffn1 > .209417) and (ffn2 < .905610 and ffn2 > .209417)
    then acc05 else add05 = add05+1
return
***** (3)
count10:
'ffn1 = 0 :ffn2 = 0
for c =1 to n
    if fz(r,c) <.5 then n1 =n1+1
    if fz(r,c) > .5 and fz(r,c) < 1 then n2 =n2+1

```

next c

ffn1 =n1/n

'print "ffn1 =",ffn1

ffn2 =n2/n

'lprint "ffn1,2 =",ffn1,ffn2,n1,n2

'***** count critical-point ***** (4)

if (ffn1 < .777559 and ffn1 > .303537) and (ffn2 < .777559 and ffn2 > .303537)

then acc10 = acc10+1 else add10 =add10+1

if (ffn1 < .812914 and ffn1 > .262378) and (ffn2 < .812914 and ffn2 > .262378)

then acc05 = acc05 +1 else add05 =add05+1

return

'***** (3.1)

count20:

'ffn1 = 0 :ffn2 = 0 : ffn3 = 0

for c =1 to n

'lprint x(r,c),c,fz(r,c)

'lprint "ffn1 before =",ffn1,ffn2,ffn3,n1,n2,n3

if fz(r,c) < .3333 then n1 =n1+1

if fz(r,c) > .3333 and fz(r,c) < .6667 then n2 =n2+1

if fz(r,c) > .6667 and fz(r,c) < 1 then n3 =n3+1

next c

ffn1 =n1/n

'lprint "ffn1 ="

ffn2 =n2/n

'lprint "ffn2 =",ffn2

ffn3 =n3/n

'lprint "ffn3 =",ffn1,ffn2,ffn3

'lprint "n1 =",n1,n2,n3

'***** count critical-point ***** (4.1)

if (ffn1 < .541507 and ffn1 > .203606) and (ffn2 < .541507 and ffn2 > .203606)

and (ffn3 < .541507 and ffn3 > .203606) then acc10= acc10+1 else add10 =add10+1

if (ffn1 < .575967 and ffn1 > .178521) and (ffn2 < .575967 and ffn2 > .178521)

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and (ffn3 < .575967 and ffn3 > .178521) then acc05 =acc05+1 else add05 =add05+1
return
'***** (3.2)
count40:
'ffn1 = 0 :ffn2 = 0 : ffn3 = 0 : ffn4 =0
for c =1 to n
  if fz(r,c) <.25 then n1 =n1+1
  if fz(r,c) > .25 and fz(r,c) < .5 then n2 =n2+1
  if fz(r,c) > .50 and fz(r,c) < .75 then n3 =n3+1
  if fz(r,c) > .75 and fz(r,c) < 1 then n4 =n4+1
next c
  ffn1 =n1/n
  ' print "ffn1 =",ffn1
  ffn2 =n2/n
  ' print "ffn2 =",ffn2
  ffn3 =n3/n
  ffn4 =n4/n
'***** count critical-point ***** (4.2)
if (ffn1 < .387060 and ffn1 > .162522) and (ffn2 < .387060 and ffn2 > .162522)
  and (ffn3 < .387060 and ffn3 > .162522) and (ffn4 < .387060 and ffn4 > .162522)
  then print "accept" else add10 =add10+1
if (ffn1 < .411962 and ffn1 > .146009) and (ffn2 < .411962 and ffn2 > .146009)
  and (ffn3 < .411962 and ffn3 > .146009) and (ffn4 < .411962 and ffn4 > .146009)
  then print "accept" else add05 =add05+1
return
'***** (5)
proboferror:
Err05 = Add05/rowdata
Err10 = Add10/rowdata
return
'*****

```

```

'*                Sub 1-A                *
'*****
'***** Report to Display *****
'*****(6)*****
report1:
cls
? "          B-test "
?
? "Sample Size N = ";n;"distribution ";dist
?
? "          .05          .10"
?
? using "Critical Value      ###      ###      ###      ### ";Add05,Add10,acc05,acc10
? using "Prob of Error      ###.####  ###.#### ";Err05,Err10
?
return
'*****

```

โปรแกรมการคำนวณ M_n

```

*****
* mnormal   Program by Wanchai Tongkai   *
*          6/11/92   21:00                *
*          update by WANNEE 22/4/95      *
*****

cls

rowdata = 500

? "          PROGRAM NORMAL DISTRIBUTION TEST"
? "          ****   WANNEE   ****"
?
?"PLEASE INPUT VALUE OF PARAMETER"
?
input "Size of Sample N : ",n
nn = n+1                'increment for compute Astar
?
'input "Parameter Zeta 1 : ",zeta1
'input "          Zeta 2 : ",zeta2
?
input "Data file name   : ",finame'
dim x(rowdata,nn),z(rowdata,nn),fz(rowdata,nn),DnAdd(rowdata,nn),
    DnSub(rowdata,nn),si(n),fee(n)
gosub readfi
'gosub main1A
'? "count05",add05
'? "count10",add10
'add051 = add05 : add101 = add10 : Err051 = Err05
'Err101 = Err10 : add05 = 0 : add10 = 0 : G05 = 0 : G10 = 0
'gosub main1B
'add052 = add05 : add102 = add10 : Err052 = Err05
'Err102 = Err10 : add05 = 0 : add10 = 0
'gosub main1C
'add053 = add05 : add103 = add10 : Err053 = Err05 : Err103 = Err10

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' add05 = 0 : add10 = 0
gosub main1d
'add053 = add05 : add103 = add10 : Err053 = Err05 : Err104 = Err10
gosub report1
? "          End Program"
end

'***** A* *****
main1A:
for r = 1 to rowdata
gosub normal
gosub computeAStar
gosub countercritical1
next r
gosub proboferror
return
'***** Dn, G *****
main1B:
for r = 1 to rowdata
gosub normal
gosub computeDn
gosub countcritical2
next r
gosub proboferror
return
'***** Gn1 *****
main1C:
for r = 1 to rowdata
gosub normal
gosub computeGn1
gosub countercritical3
next r
gosub proboferror

```

```

return
'***** MN *****
main1d:
for r = 1 to rowdata
gosub setsix
gosub normalnew
gosub computeMn
gosub countercritical4
next r
gosub proboferror
return
'***** end main *****
'*****
'
          SUB PROGRAM
'*****
readfi:
open "i",#1,finame'
for r = 1 to rowdata
for c = 1 to n
input #1,x(r,c)
        locate 14,1 : ? using "Read Data ROW = ### COL = ## X = ###.####";r,c,x(r,c)
next c
next r
close
'sortdata:
?:?:?"Please wait for sort data"
?
for r = 1 to rowdata
        for i = 1 to n-1
for j = 1 to n-1
        if x(r,j) > x(r,j+1) then swap x(r,j),x(r,j+1)
next j,i

```

```

'for check same data 3 value

same = 1

temp = x(r,1)

for i = 2 to n
if temp = x(r,i) then same = same+1 else temp = x(r,i)
next i

if same > 2 then ??:? "SORRY DATA CAN NOT USE (3 TIES)" : END

next r

return

'***** step 4-7 *****

normal:

'value of r from main program

locate 15,1 : 7 using "Compute data group ###";r

ze1 = 0

for c = 1 to n
ze1 = ze1 + x(r,c)
next c

zeta1 = ze1/n

ze2 = 0

for c = 1 to n
ze2 = ze2 + ( x(r,c)-zeta1 )^2
next c

zeta2 = sqr(ze2/(n-1))

for c = 1 to n
z(r,c) = (x(r,c)-zeta1)/zeta2
next c

'***** sort data ***** (5)

'sort for z(r,j) move to after read data for check 3 ties

'***** compute P(Z < Zi) **** (6),(7)

for c = 1 to n
az = abs(z(r,c))

t1 = 1/(1+0.2916419*az)

```

```

dz = 0.3989423 * exp( -1 * (z(r,c) * z(r,c)) / 2)

if z(r,c) > 0 then
  fz(r,c)=1-dz*t1*(((1.330274*t1-1.821256)*t1+1.781478)*t1-0.3565688)*t1+0.3198815)
end if

if z(r,c) <= 0 then
  fz(r,c)=dz*t1*(((1.330274*t1-1.821256)*t1+1.781478)*t1-0.3565688)*t1+0.3198815)
end if

  next c
return
'*****normal new *****
normalnew:
'value of r from main program
locate 15,1 : ? using "Compute data group ###";r
ze1 = 0
for c = 1 to n
ze1 = ze1 + x(r,c)
next c
zeta1 = ze1/n
ze2 = 0
for c = 1 to n
ze2 = ze2 + ( x(r,c)-zeta1 )^2
next c
zeta2 = sqr(ze2/(n-1))
'for c = 1 to n
'z(r,c) = (x(r,c)-zeta1)/zeta2
'next c
'***** sort data ***** (5)
'sort for z(r,j) move to after read data for check 3 ties
'***** compute P(Z < Zi) **** (6),(7)
for c = 1 to n
az = abs(z(r,c))
t1 = 1/(1+0.2316419*az)

```

```

dz = 0.3989423 * exp( -1 * (z(r,c) * z(r,c)) / 2)

if z(r,c) > 0 then
  fz(r,c)=1-dz*t1*(((1.330274*t1-1.821256)*t1+1.781478)*t1-0.3565688)*t1+0.3198815)
end if

if z(r,c) <= 0 then
  fz(r,c)=dz*t1*(((1.330274*t1-1.821256)*t1+1.781478)*t1-0.3565688)*t1+0.3198815)
end if

  next c

return

'*****set six*****

setsix:

if n = 5 then gosub setsi5
if n = 10 then gosub setsi10
if n = 20 then gosub setsi20

return

setsi5:
si(1)=-.9661 :si(2)=-.4316 :si(3)=0 :si(4)=.4316 :si(5)=.9661

return

setsi10:
si(1)=-1.3346 :si(2)=-.9078 :si(3)=-.6038 :si(4)=-.3478 :si(5)=-.1130
si(6)=.1130 :si(7)=.3478 :si(8)=.6038 :si(9)=.9078 :si(10)=1.3346

return

setsi20:
si(1)=-1.6646 :si(2)=-1.3106 :si(3)=-1.0669 :si(4)=-.8742 :si(5)=-.7128
si(6)=-.5651 :si(7)=-.4316 :si(8)=-.3029 :si(9)=-.1789 :si(10)=-.0602
si(11)=.0602 :si(12)=.1789 :si(13)=.3029 :si(14)=.4316 :si(15)=.5651
si(16)=.7128 :si(17)=.8742 :si(18)=1.0669 :si(19)=1.3106 :si(20)=1.6646

return

'***** (11)

proboferror:

e05 =a05/500

e10 =a10/500

```

```

Err05 = Add05/rowdata
Err10 = Add10/rowdata
errg05 =g05/rowdata
errg10 =g10/rowdata
erg05 =gadj05/rowdata
erg10 =gadj10/rowdata
return
'*****
'*          Sub 1-A          *
'*****
' compute A*          **** (8)
computeAStar:
Astar = 0
for c = 1 to n
fz(r,0) = -1 * fz(r,1)
fz(r,n+1) = 2-fz(r,n)
AStar = Astar + ( ( fz(r,c+1)-fz(r,c-1))/2 ) - (1/n) )^2
next c
AStar = AStar * .5
return
'***** count critical-point ***** (9)
countercritical:
if n = 5 then
    if AStar > .026 then Add05 = Add05 + 1
    if AStar > .022 then Add10 = Add10 + 1
end if
if n = 10 then
    if AStar > .025 then Add05 = Add05 + 1
    if AStar > .021 then Add10 = Add10 + 1
end if
if n = 20 then
    if AStar > .016 then Add05 = Add05 + 1

```

```

if AStar > .013 then Add10 = Add10 + 1
end if

return

'***** Report to Display *****
report1:
cls
? "          NORMAL DISTRIBUTION : KNOWN PARAMETER"
? "          TRADITIONAL KOLMOGOROV-SMIRNOV TEST : AStar (A*)"
?
? "Sample Size N = ";n;"Parameter Z1 = ";zeta1;" Z2 = ";zeta2
?
? "          .05          .10"
?
'? using "Critical Value  AStar  ###          ###          ";Add051,Add101
'? using "Prob of Error   AStar  ###.####   ###.####   ";Err051,Err101
'?
'? using "Critical Value  DnMAX  ###          ###          ";Add052,Add102
'? using "Prob of Error   DnMax  ###.####   ###.####   ";Err052,Err102
'?
'? using "Critical Value  G      ###          ###          ";G05,g10
'? using "Prob of Error   G      ###.####   ###.####   ";ErrG05,errg10
'?
'? using "Critical Value  Gn1    ###          ###          ";Add053,Add103
'? using "Prob of Error   Gn1    ###.####   ###.####   ";Err053,Err103
?
? using "Critical Value  mn      ###          ###          ";A05,A10
? using "Prob of Error   mn      ###.####   ###.####   ";E05,E10
return

'*****
'*          Sub 1-B          *

```

```
*****
```

```
'compute Mn
```

```
computemn:
```

```
mn = 0
```

```
for c = 1 to n
```

```
  fee(si(c)) = exp(-(si(c))^2/2)/sqr(2*22/7)
```

```
  m = (((x(r,c)-Zeta1)/zeta2)-si(c))^2 *fee(si(c))
```

```
  mn = mn+m
```

```
next c
```

```
'lprint "mn =",mn
```

```
gosub probsoferror
```

```
return
```

```
counteritical4:
```

```
if n = 5 then
```

```
  if mn > .313 then Add05 = Add05 + 1
```

```
  if mn > .268 then Add10 = Add10 + 1
```

```
end if
```

```
if n = 10 then
```

```
  if mn > .370 then A05 = A05 + 1
```

```
  if mn > .327 then A10 = A10 + 1
```

```
end if
```

```
if n = 20 then
```

```
  if mn > .414 then A05 = A05 + 1
```

```
  if mn > .351 then A10 = A10 + 1
```

```
end if
```

```
' compute DnMax, DnMin (G) **** (8)
```

```
computeDn:
```

```
MinDnAdd = 9999 : MaxDnAdd = 0 : MinDnSub = 9999 : MaxDnSub = 0 : Dn = 0 : G=0
```

```
for c = 1 to n
```

```
  DnAdd(r,c) = (c/n - fa(r,c))
```



```

DnSub(r,c) = ( fz(r,c) - (c-1)/n )
if DnAdd(r,c) > MaxDnAdd then MaxDnAdd = DnAdd(r,c)
if DnSub(r,c) > MaxDnSub then MaxDnSub = DnSub(r,c)
'if DnAdd(r,c) < MinDnAdd then MinDnAdd = DnAdd(r,c)
'if DnSub(r,c) < MinDnSub then MinDnSub = DnSub(r,c)
next c
GAdd = MinDnAdd : GSub = MinDnSub
if MaxDnAdd > MaxDnSub then Dn = MaxDnAdd else Dn = MaxDnSub
if MaxDnAdd < MaxDnSub then G = MaxDnAdd else G = MaxDnSub
return
'***** count critical-point ***** (9)
countcritical2:
if n = 5 then
    if G > 0.242 then G05 = G05 + 1
    if G > 0.228 then G10 = G10 + 1
    if Dn > 0.337 then Add05 = Add05 + 1
    if Dn > 0.315 then Add10 = Add10 + 1
end if
if n = 10 then
    if G > 0.184 then G05 = G05 + 1
    if G > 0.171 then G10 = G10 + 1
    if Dn > 0.258 then Add05 = Add05 + 1
    if Dn > 0.239 then Add10 = Add10 + 1
end if
if n = 20 then
    if G > 0.135 then G05 = G05 + 1
    if G > 0.124 then G10 = G10 + 1
    if Dn > 0.190 then Add05 = Add05 + 1
    if Dn > 0.174 then Add10 = Add10 + 1
end if
return

```

```

*****
'*          Sub 1-D          *
*****
' compute DnAdd, DnSub ***** (8)
computeGn1:
MaxDnAdd = 0 : MaxDnSub = 0 : Dn = 0
for c = 1 to n
DnAdd(r,c) = abs( (c-1)/(n-1) - fz(r,c) )
DnSub(r,c) = abs( fz(r,c) - (c-1)/(n-1) )
if DnAdd(r,c) > MaxDnAdd then MaxDnAdd = DnAdd(r,c)
if DnSub(r,c) > MaxDnSub then MaxDnSub = DnSub(r,c)
next c
if MaxDnAdd > MaxDnSub then Dn = MaxDnAdd else Dn = MaxDnSub
Gn = Dn
return
***** count critical-point ***** (9)
countcritical3:
if n = 5 then
if Gn > 0.282 then Add05 = Add05 + 1
if Gn > 0.249 then Add10 = Add10 + 1
end if
if n = 10 then
if Gn > 0.227 then Add05 = Add05 + 1
if Gn > 0.205 then Add10 = Add10 + 1
end if
if n = 20 then
if Gn > 0.173 then Add05 = Add05 + 1
if Gn > 0.157 then Add10 = Add10 + 1
end if
return

```

โปรแกรมการคำนวณ X_g^2

```
' file "omeka5.bas  24/4/95"

cls

input "number of spacing ", KK
input "distribution :normal=1,expo=2  ",dist

NN = 50

input "File name Number 1 : ",filename1'
input "File name Number 2 : ",filename2'
input "File name Number 3 : ",filename2'
input "File name Number 4 : ",filename2'
input "File name Number 5 : ",filename2'

gosub readandsort

dim p(kk+2),u(kk+2),f(kk+2),n(kk+2),k(kk+2)
dim v(kk,1),vt(1,kk),w(kk,kk),ab(1,kk)
dim x(100,NN),xbar(100),sd(100)
dim x1(100,NN),x2(100,NN),x3(100,NN),x4(100,NN),x5(100,NN)

if dist =1 then gosub spacenn
if dist =2 then gosub spacexp

spacenn:
if kk=4 then gosub spacen4
if kk=10 then gosub spacen10
if kk=13 then gosub spacen13
if kk=15 then gosub spacen15
return

spacexp:
if kk=4 then gosub spacexp4
if kk=10 then gosub spacexp10
if kk=13 then gosub spacexp13
if kk=15 then gosub spacexp15
return

spacen4:
```

$p(0) = 0 : p(1) = 0.2 : p(2) = 0.4 : p(3) = 0.6 : p(4) = 0.8 : p(5) = 1$

$u(0) = 0 : u(1) = -.8416 : u(2) = -.2533 : u(3) = .2533 : u(4) = .8416 : u(5) = 0$

return

space10:

$p(0) = 0 : p(1) = 0.0909 : p(2) = 0.1818 : p(3) = 0.2727 : p(4) = 0.3636 : p(5) = 0.4545$

$p(6) = 0.5455 : p(7) = 0.6364 : p(8) = 0.7273 : p(9) = 0.8182 : p(10) = .9091 : p(11) = 1$

$u(0) = 0 : u(1) = -1.3346 : u(2) = -.9078 : u(3) = -.6038 : u(4) = -.3478 : u(5) = -.1130$

$u(6) = .1130 : u(7) = .3478 : u(8) = .6038 : u(9) = .9078 : u(10) = 1.3346 : u(11) = 0$

return

space13:

$p(0) = 0 : p(1) = 0.0714 : p(2) = 0.1429 : p(3) = 0.2143 : p(4) = 0.2857 : p(5) = 0.3571$

$p(6) = 0.4286 : p(7) = 0.5 : p(8) = 0.5714 : p(9) = 0.6429 : p(10) = .7143 : p(11) = 1$

$p(12) = 0.8571 : p(13) = .9286 : p(14) = 1$

$u(0) = 0 : u(1) = -1.4684 : u(2) = -1.0669 : u(3) = -.7926 : u(4) = -.5651 : u(5) = -.3665$

$u(6) = -.1789 : u(7) = 0 : u(8) = .1789 : u(9) = .3665 : u(10) = 0.5651 : u(11) = 0.7926$

$u(12) = 1.0669 : u(13) = 1.4684 : u(14) = 0$

return

space15:

$p(0) = 0 : p(1) = 0.0625 : p(2) = 0.125 : p(3) = 0.1875 : p(4) = 0.25 : p(5) = 0.3125$

$p(6) = 0.3750 : p(7) = 0.4375 : p(8) = 0.5 : p(9) = 0.5625 : p(10) = .6250 : p(11) = .6875$

$p(12) = 0.75 : p(13) = .8125 : p(14) = 0.875 : p(15) = .9375 : p(16) = 1$

$u(0) = 0 : u(1) = -1.5301 : u(2) = -1.1503 : u(3) = -.8853 : u(4) = -.6745 : u(5) = -.4874$

$u(6) = -.3186 : u(7) = -0.1560 : u(8) = 0 : u(9) = .156 : u(10) = 0.3186 : u(11) = 0.4872$

$u(12) = .6745 : u(13) = 0.8853 : u(14) = 1.1503 : u(15) = 1.5301 : u(16) = 0$

return

space4:

$p(0) = 0 : p(1) = 0.2 : p(2) = 0.4 : p(3) = 0.6 : p(4) = 0.8 : p(5) = 1$

$u(0) = 0 : u(1) = .2231 : u(2) = .5108 : u(3) = .9163 : u(4) = 1.6094 : u(5) = 0$

return

space10:

$p(0) = 0 : p(1) = 0.0909 : p(2) = 0.1818 : p(3) = 0.2727 : p(4) = 0.3636 : p(5) = 0.4545$

$p(6) = 0.5455 : p(7) = 0.6364 : p(8) = 0.7273 : p(9) = 0.8182 : p(10) = .9091 : p(11) = 1$

```

u(0) = 0 :u(1) = 0.0964 :u(2) = 0.2006: u(3) =0.3184 :u(4) =0.4519 :u(5) = 0.6061
u(6) = .7886 :u(7) =1.0117 :u(8) =1.2993: u(9) =1.7048 :u(10) =2.3979 :u(11) = 0
return

```

```
spacexp13:
```

```

p(0) = 0 :p(1) = 0.0714: p(2) = 0.1429 : p(3) = 0.2143 :p(4) = 0.2857 : p(5) = 0.3571
p(6) = 0.4286: p(7) = 0.5 : p(8) = 0.5714:p(9) = 0.6429 : p(10) =.7143 : p(11) =1
p(12) = 0.8571 : p(13) =.9286 : p(14) =1
u(0) = 0 :u(1) = 0.0741 :u(2) = .1542: u(3) =.2412 :u(4) =.3364 :u(5) = .4418
u(6) =.5597 :u(7) = 0.6931 :u(8) = .8472: u(9) =1.0297 :u(10) =1.2528 :u(11) = 1.5404
u(12) =1.9456 :u(13) = 2.6394 :u(14) = 0
return

```

```
space15:
```

```

p(0) = 0 :p(1) = 0.0625: p(2) = 0.125 : p(3) = 0.1875 :p(4) = 0.25 : p(5) = 0.3125
p(6) = 0.3750: p(7) = 0.4375 : p(8) = 0.5:p(9) = 0.5625 : p(10) =.6250 : p(11) =.6875
p(12) = 0.75 : p(13) =.8125 : p(14) = 0.875: p(15) =.9375 : p(16) =1
u(0) = 0 :u(1) = .0645 :u(2) = .1335: u(3) =.2076 :u(4) =.2876 :u(5) = .3747
u(6) =.4700 :u(7) = 0.5753 :u(8) = 0.6931 : u(9) =.8267 :u(10) =0.9808 :u(11) = 1.1632
u(12) =1.3862 :u(13) =1.6739 :u(14) = 2.0794 :u(15) =2.7726:u(16) = 0
return

```

```
reject = 0 :accept =0
```

```
ll = 0
```

```
gosub computel
```

```
locate 10,10 : ? "Row Landahat Deltahat Xsquare Reject"
```

```
for ll = 1 to 5
```

```
gosub moveinX
```

```
for rr = 1 to 100
```

```
ll = ll+1
```

```
gosub compute2
```

```
if xsquare > 10.60 then reject = reject +1 else accept =accept +1
```

```
locate 12,10 :?using "### ###.### ###.### ###.### ### ###";l1,landahat,deltahat,x
```

```
next rr
```

```
next LL
```

```
end
```

```
'*****
```

```
Compute1:
```

```
for i = 0 to kk+1
```

```
f(i) = 1/sqr(2*22/7)*exp(-u(i)^2/2)
```

```
n(i) = int((NN*p(i)) + 1)
```

```
next i
```

```
*f(0) = 0 : f(kk+1) = 0
```

```
n(0) = 0 : n(kk+1) = 0
```

```
k(1) = 0 : k(2) = 0 : k(3) = 0 : k(4) = 0 : k(5) = 0 : x = 0 : y = 0
```

```
for i = 1 to kk+1
```

```
k(1) = k(1) + ( (f(i)-f(i-1))^2 / (p(i)-p(i-1)) )
```

```
k(2) = k(2) + ( (u(i)*f(i)) - (u(i-1)*f(i-1))^2 / (p(i) - p(i-1)) )
```

```
k(3) = k(3) + ( (f(i)-f(i-1))*( (u(i)*f(i)) - (u(i-1)*f(i-1)) ) ) / (p(i) - p(i-1))
```

```
next i
```

```
delta = (k(1)*k(2)) - k(3)^2
```

```
'----- compute W -----
```

```
for i = 1 to kk
```

```
for j = 1 to kk
```

```

for i = 1 to kk
v(i,1) = x(rr,n(i)) - landahat - deltahat*u(i)
vt(1,i) = v(i,1)
next i
'----- Omega, SS -----
for p = 1 to 1
for q = 1 to kk
ab(p,q) = 0
for r = 1 to kk
ab(p,q) = ab(p,q) + (vt(p,r)*w(r,q))
next r
next q
next p
for p = 1 to 1
for q = 1 to 1
Omega = 0
for r = 1 to kk
Omega = Omega + (ab(p,r)*v(r,q))
next r
next q
next p
Xsquare= NN*Omega/SD(rr)
return

```

```

'***** Read and Sort *****

```

```

ReadandSort:

```

```

open "i",#1,finame1'

```

```

for r = 1 to 100

```

```
for c = 1 to NN
input #1,x1(r,c)
locate 10,10 : ?using "Read data Loop 1 Row ###";r
next c
next r
close #1

open "i",#1,finame2'
for r = 1 to 100
for c = 1 to NN
input #1,x2(r,c)
locate 10,10 : ?using "Read data Loop 2 Row ###";r
next c
next r
close #2
open "i",#1,finame1'
for r = 1 to 100
for c = 1 to NN
input #1,x3(r,c)
locate 10,10 : ?using "Read data Loop 1 Row ###";r
next c
next r
close #3
open "i",#1,finame4'
for r = 1 to 100
for c = 1 to NN
input #1,x4(r,c)
locate 10,10 : ?using "Read data Loop 1 Row ###";r
next c
next r
close #4
open "i",#1,finame5'
```



```

for r = 1 to 100
for c = 1 to NN
input #1,x5(r,c)
locate 10,10 : ?using "Read data Loop 1 Row ###";r
next c
next r
close #5
'----- sort -----
for r = 1 to 100
locate 10,10 : ?using "Sort data for 1 Loop Row ###";r
for i = 1 to NN-1
for j = 1 to NN-1
if x1(r,j) > x1(r,j+1) then swap x1(r,j),x1(r,j+1)
if x2(r,j) > x2(r,j+1) then swap x2(r,j),x2(r,j+1)
if x3(r,j) > x3(r,j+1) then swap x3(r,j),x3(r,j+1)
if x4(r,j) > x4(r,j+1) then swap x4(r,j),x4(r,j+1)
if x5(r,j) > x5(r,j+1) then swap x5(r,j),x5(r,j+1)
next j
next i
next r
return

'***** move data into X and Xbar,SD *****
moveinX:
for r = 1 to 100
Xbar(r) = 0
for c = 1 to NN
x(r,c) = 0
if LL = 1 then
x(r,c) = x1(r,c)
else
x(r,c) = x2(r,c)

```

```
end if
xbar(r) = xbar(r) + x(r,c)
next c
Xbar(r) = Xbar(r)/NN
next r
for r = 1 to 100
SD(r) = 0
for c = 1 to NN
SD(r) = SD(r) + (x(r,c)-Xbar(r))^2
next c
SD(r) = SD(r)/NN
next r
return
```

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```

w(i,j) = 0
if i = j then
w(i,j) = f(i)^2*( (p(i+1)-p(i))^-1 + (p(i)-p(i-1))^-1 )
else
if i < j then
w(i,j) = -f(i) * f(i+1) * (p(i+1)-p(i))^-1
else
w(i,j) = -f(j) * f(j+1) * (p(j+1)-p(j))^-1
end if
end if
if abs(j-i) >= 2 then w(i,j) = 0
next j
next i
'for r = 1 to kk
'for c = 1 to kk
'?using "###.###" ;w(r,c);
'next c
'?
'next r
'stop
return

'***** compute Vector,Vector Transpose *****

Compute2:
XX = 0 : YY = 0
for i = 1 to kk+1
XX = XX + ( (f(i)-f(i-1)) * ( (x(rr,n(i))*f(i)) - (x(rr,n(i-1))*f(i-1)) ) / (p(i)-p(i-1)) )
YY = YY + ( ((n(i)*f(i))-n(i-1)*f(i-1)) * ( (x(rr,n(i))*f(i)) - (x(rr,n(i-1))*f(i-1)) ) / (p(i)-p(i-1)) )
next i

landahat = 1/delta * ( (k(2)*XX) - (k(3)*YY) )
deltahat = 1/delta * ( (k(1)*YY) - (k(3)*XX) )

```