

```

lastsave.txt
> # 1) Mathematics as given in the powe point
> x=2
> y=9
> z=x*y
> z
[1] 18
> print(z)
[1] 18
> K=c(1,2,5,3,10)

> K
[1] 1 2 5 3 10

> # print used for printing one variable
> # cat is used for printing more than one
variable
> cat(x,y,z,K)
2 9 18 1 2 5 3 10>
> cat(x,y,z,K,"\n")
2 9 18 1 2 5 3 10

> # descriptive statistics

> #mean(x)
> # var(x)
> # sd(x)
> # median(x)
> #range(x)
> # Summary(x) gives minimum Q1 median
mean Q3 max
> # coeffeient of variation CV= sd(x)/mean(x)

> summary(x)
  Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
     2      2      2      2      2      2

> cv=sd(K)/mean(K)
> print(cv)
[1] 0.8485014

> # الاسهم تعطينا الاوامر السابقة او التالية

```

lastsave.txt

```
> # file ---New script--- تظهر لنا نافذة R
Editor--- ونضغط وننسخها وننسخها وننسخها
> # R console النتائج وننسخها وننسخها وننسخها
```

```
> x=2
> y=3
> z=x*y
> print(z)
[1] 6
```

```
> # 3) Loop هو استخدام الاقواس { } وبينهما الامر المطلوب تكراره
```

```
>
> for(i in 1:10)
+ {
+ print(i)
+ }
[1] 1
[1] 2
[1] 3
[1] 4
[1] 5
[1] 6
[1] 7
[1] 8
[1] 9
[1] 10
```

```
> # file----save as لحفظ الملف نقف بالمؤشر داخل الصفحة ومن
```

```
> # file-----open script لفتح ملف قديم
```

```
> for(i in 0:10)
+ {
+ cat(i,i^2,i*3)
+ }
0 0 01 1 32 4 63 9 94 16 125 25 156 36 187 49 218
64 249 81 2710 100 30> for(i in 0:10)
+ {
+ cat(i,i^2,i*3)
+ cat(i,i^2,i*3,"\n")
+ }
0 0 00 0 0
1 1 31 1 3
```

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```
2 4 62 4 6
3 9 93 9 9
4 16 124 16 12
5 25 155 25 15
6 36 186 36 18
7 49 217 49 21
8 64 248 64 24
9 81 279 81 27
10 100 3010 100 30
> for(i in 0:10)
+ {
+   cat(i,i^2,i*3,"\n")
+ }
0 0 0
1 1 3
2 4 6
3 9 9
4 16 12
5 25 15
6 36 18
7 49 21
8 64 24
9 81 27
10 100 30
> # "\n" معناها ضع النتائج بنفس السطر
> for(i in 0:10)
+ {
+   x1=i+2
+   x2=sqrt(i)
+   x3=i^3+2*i
+   cat(i," ",x1," ",x2," ",x3,"\n")
+ }
0 2 0 0
1 3 1 3
2 4 1.414214 12
3 5 1.732051 33
4 6 2 72
5 7 2.236068 135
6 8 2.44949 228
7 9 2.645751 357
8 10 2.828427 528
```

```

                                lastsave.txt
9      11      3      747
10     12     3.162278     1020
> #      "      "      لوضع مسافة بين الاعمدة لتكون متباعدة
>
> # Distributions
>
> ## dnorm-----calculate normal f(x)
> ## pnorm-----          normal F(x) CDF
> ## qnorm-----          normal inverse (find the
value of x)
> ## rnorm-----          normal random sample
>
> ## Examples
>
> # if x has N(2,9). find f(x=1.5), F(0.75), p(x>
1.5)
> # f(1.5)=dnorm(1.5,2,sqrt(9))
> dnorm(1.5,2,sqrt(9))
[1] 0.1311466
> # F(0.75)=pnorm(0.75,2,3)
> pnorm(0.75,2,3)
[1] 0.3384611
> ## p(x>1.5)=1-pnorm(1.5,2,3)
> 1-pnorm(1.5,2,3)
[1] 0.5661838
> ## if x has standard normal N(0,1), we need
not to put the values 0, 1 in the command as
follows:
> ## let x has N(0,1) , find p(x<2) and find a if
p(x<a)=0.975
> # P(x<2)=pnorm(2) and a= qnorm(0.975)
> pnorm(2)
[1] 0.9772499
> qnorm(0.975)

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```
[1] 1.959964
```

```
> ### find random sample from normal (1,4)has size  
10
```

```
> rnorm(10,1,2)
```

```
[1] -1.0219220 -2.2359595 -0.9670488 1.7617904  
2.6505148 0.2426578 -0.8236448 2.3430551  
4.9988127 -0.2156232
```

```
> rnorm(10)
```

```
[1] -1.3424810 -1.1931046 -0.4511279 -3.6477612  
0.0843024 -0.9119739 1.3767376 -0.7590830  
1.4619257 0.0967894
```

```
> ##### to construct standard normal table, we  
have to use loop
```

```
> for(z in 0:34)
```

```
+ {
```

```
+ Z=z/10
```

```
+ pz=pnorm(z)
```

```
+ cat(Z," ",pz,"\n")
```

```
+ }
```

```
0 0.5
```

```
0.1 0.8413447
```

```
0.2 0.9772499
```

```
0.3 0.9986501
```

```
0.4 0.9999683
```

```
0.5 0.9999997
```

```
0.6 1
```

```
0.7 1
```

```
0.8 1
```

```
0.9 1
```

```
1 1
```

```
1.1 1
```

```
1.2 1
```

```
1.3 1
```

```
1.4 1
```

```
1.5 1
```

```
1.6 1
```

lastsave.txt

1.7	1
1.8	1
1.9	1
2	1
2.1	1
2.2	1
2.3	1
2.4	1
2.5	1
2.6	1
2.7	1
2.8	1
2.9	1
3	1
3.1	1
3.2	1
3.3	1
3.4	1

```
> options(digits=4)
>
> for(z in 0:34)
+ {
+   Z=z/10
+   pz=pnorm(Z)
+   cat(Z," ",pz,"\n")
+ }
0      0.5
0.1    0.5398
0.2    0.5793
0.3    0.6179
0.4    0.6554
0.5    0.6915
0.6    0.7257
0.7    0.758
0.8    0.7881
0.9    0.8159
1      0.8413
1.1    0.8643
1.2    0.8849
1.3    0.9032
```

lastsave.txt

1.4	0.9192
1.5	0.9332
1.6	0.9452
1.7	0.9554
1.8	0.9641
1.9	0.9713
2	0.9772
2.1	0.9821
2.2	0.9861
2.3	0.9893
2.4	0.9918
2.5	0.9938
2.6	0.9953
2.7	0.9965
2.8	0.9974
2.9	0.9981
3	0.9987
3.1	0.999
3.2	0.9993
3.3	0.9995
3.4	0.9997

```
> for(z in 0:34)
+ {
+   Z=z/10
+   p=pnorm(Z)
+   p1=pnorm(Z+0.01)
+   p2=pnorm(Z+0.02)
+   p3=pnorm(Z+0.03)
+   cat(Z," ",p," ",p1," ",p2," ",p3,"\n")
+ }
```

0	0.5	0.504	0.508	0.512
0.1	0.5398	0.5438	0.5478	0.5517
0.2	0.5793	0.5832	0.5871	0.591
0.3	0.6179	0.6217	0.6255	0.6293
0.4	0.6554	0.6591	0.6628	0.6664
0.5	0.6915	0.695	0.6985	0.7019
0.6	0.7257	0.7291	0.7324	0.7357
0.7	0.758	0.7611	0.7642	0.7673
0.8	0.7881	0.791	0.7939	0.7967

```

                                lastsave.txt
0.9      0.8159      0.8186      0.8212      0.8238
1      0.8413      0.8438      0.8461      0.8485
1.1      0.8643      0.8665      0.8686      0.8708
1.2      0.8849      0.8869      0.8888      0.8907
1.3      0.9032      0.9049      0.9066      0.9082
1.4      0.9192      0.9207      0.9222      0.9236
1.5      0.9332      0.9345      0.9357      0.937
1.6      0.9452      0.9463      0.9474      0.9484
1.7      0.9554      0.9564      0.9573      0.9582
1.8      0.9641      0.9649      0.9656      0.9664
1.9      0.9713      0.9719      0.9726      0.9732
2      0.9772      0.9778      0.9783      0.9788
2.1      0.9821      0.9826      0.983      0.9834
2.2      0.9861      0.9864      0.9868      0.9871
2.3      0.9893      0.9896      0.9898      0.9901
2.4      0.9918      0.992      0.9922      0.9925
2.5      0.9938      0.994      0.9941      0.9943
2.6      0.9953      0.9955      0.9956      0.9957
2.7      0.9965      0.9966      0.9967      0.9968
2.8      0.9974      0.9975      0.9976      0.9977
2.9      0.9981      0.9982      0.9982      0.9983
3      0.9987      0.9987      0.9987      0.9988
3.1      0.999      0.9991      0.9991      0.9991
3.2      0.9993      0.9993      0.9994      0.9994
3.3      0.9995      0.9995      0.9995      0.9996
3.4      0.9997      0.9997      0.9997      0.9997
>

```

```

> ###  anothe method(code 2)

```

```

> i=seq(0,3.49,by=0.01)
> p=pnorm(i)
> m=matrix(p,ncol=10,byrow=TRUE)
> rownames(m)=seq(0,3.4,by=0.1)
> colnames(m)=seq(0,0.09,by=0.01)
> options(digits=4)
> m
      0      0.01      0.02      0.03      0.04      0.05
0.06      0.07      0.08      0.09
0      0.5000 0.5040 0.5080 0.5120 0.5160 0.5199
0.5239 0.5279 0.5319 0.5359

```



```

                                lastsave.txt
0.1 0.5398 0.5438 0.5478 0.5517 0.5557 0.5596
0.5636 0.5675 0.5714 0.5753
0.2 0.5793 0.5832 0.5871 0.5910 0.5948 0.5987
0.6026 0.6064 0.6103 0.6141
0.3 0.6179 0.6217 0.6255 0.6293 0.6331 0.6368
0.6406 0.6443 0.6480 0.6517
0.4 0.6554 0.6591 0.6628 0.6664 0.6700 0.6736
0.6772 0.6808 0.6844 0.6879
0.5 0.6915 0.6950 0.6985 0.7019 0.7054 0.7088
0.7123 0.7157 0.7190 0.7224
0.6 0.7257 0.7291 0.7324 0.7357 0.7389 0.7422
0.7454 0.7486 0.7517 0.7549
0.7 0.7580 0.7611 0.7642 0.7673 0.7704 0.7734
0.7764 0.7794 0.7823 0.7852
0.8 0.7881 0.7910 0.7939 0.7967 0.7995 0.8023
0.8051 0.8078 0.8106 0.8133
0.9 0.8159 0.8186 0.8212 0.8238 0.8264 0.8289
0.8315 0.8340 0.8365 0.8389
1    0.8413 0.8438 0.8461 0.8485 0.8508 0.8531
0.8554 0.8577 0.8599 0.8621
1.1 0.8643 0.8665 0.8686 0.8708 0.8729 0.8749
0.8770 0.8790 0.8810 0.8830
1.2 0.8849 0.8869 0.8888 0.8907 0.8925 0.8944
0.8962 0.8980 0.8997 0.9015
1.3 0.9032 0.9049 0.9066 0.9082 0.9099 0.9115
0.9131 0.9147 0.9162 0.9177
1.4 0.9192 0.9207 0.9222 0.9236 0.9251 0.9265
0.9279 0.9292 0.9306 0.9319
1.5 0.9332 0.9345 0.9357 0.9370 0.9382 0.9394
0.9406 0.9418 0.9429 0.9441
1.6 0.9452 0.9463 0.9474 0.9484 0.9495 0.9505
0.9515 0.9525 0.9535 0.9545
1.7 0.9554 0.9564 0.9573 0.9582 0.9591 0.9599
0.9608 0.9616 0.9625 0.9633
1.8 0.9641 0.9649 0.9656 0.9664 0.9671 0.9678
0.9686 0.9693 0.9699 0.9706
1.9 0.9713 0.9719 0.9726 0.9732 0.9738 0.9744
0.9750 0.9756 0.9761 0.9767
2    0.9772 0.9778 0.9783 0.9788 0.9793 0.9798
0.9803 0.9808 0.9812 0.9817
2.1 0.9821 0.9826 0.9830 0.9834 0.9838 0.9842

```

lastsave.txt  
0.9846 0.9850 0.9854 0.9857  
2.2 0.9861 0.9864 0.9868 0.9871 0.9875 0.9878  
0.9881 0.9884 0.9887 0.9890  
2.3 0.9893 0.9896 0.9898 0.9901 0.9904 0.9906  
0.9909 0.9911 0.9913 0.9916  
2.4 0.9918 0.9920 0.9922 0.9925 0.9927 0.9929  
0.9931 0.9932 0.9934 0.9936  
2.5 0.9938 0.9940 0.9941 0.9943 0.9945 0.9946  
0.9948 0.9949 0.9951 0.9952  
2.6 0.9953 0.9955 0.9956 0.9957 0.9959 0.9960  
0.9961 0.9962 0.9963 0.9964  
2.7 0.9965 0.9966 0.9967 0.9968 0.9969 0.9970  
0.9971 0.9972 0.9973 0.9974  
2.8 0.9974 0.9975 0.9976 0.9977 0.9977 0.9978  
0.9979 0.9979 0.9980 0.9981  
2.9 0.9981 0.9982 0.9982 0.9983 0.9984 0.9984  
0.9985 0.9985 0.9986 0.9986  
3 0.9987 0.9987 0.9987 0.9988 0.9988 0.9989  
0.9989 0.9989 0.9990 0.9990  
3.1 0.9990 0.9991 0.9991 0.9991 0.9992 0.9992  
0.9992 0.9992 0.9993 0.9993  
3.2 0.9993 0.9993 0.9994 0.9994 0.9994 0.9994  
0.9994 0.9995 0.9995 0.9995  
3.3 0.9995 0.9995 0.9995 0.9996 0.9996 0.9996  
0.9996 0.9996 0.9996 0.9997  
3.4 0.9997 0.9997 0.9997 0.9997 0.9997 0.9997  
0.9997 0.9997 0.9997 0.9998