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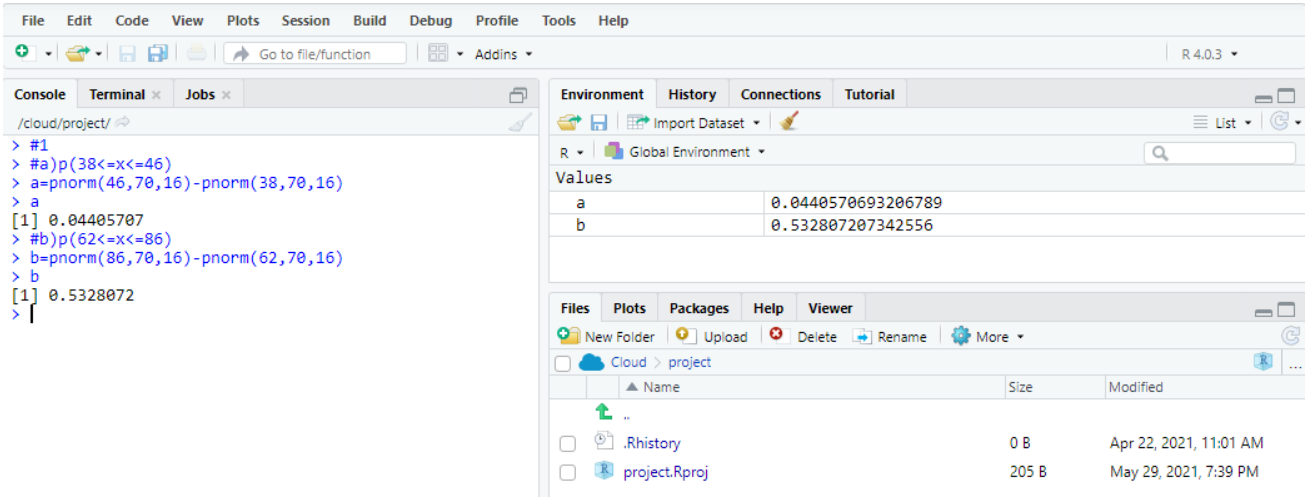
20MIA1150

Assignment_MAT1021(LAB)

On Normal distribution:

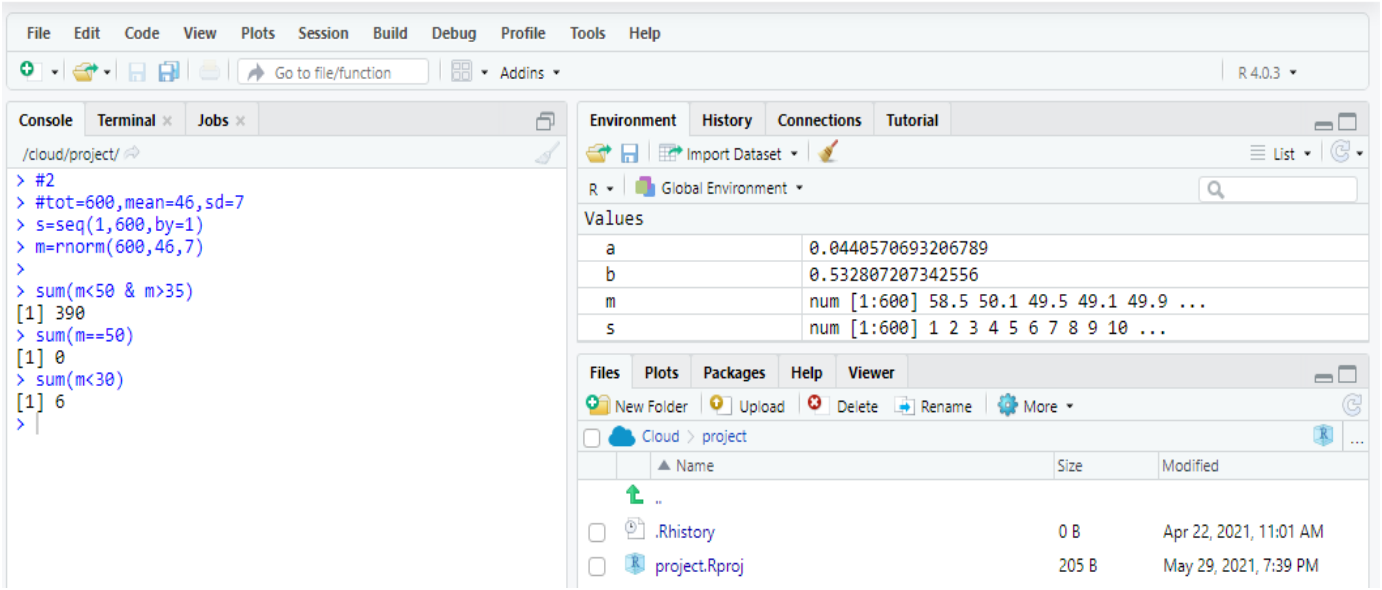
1. If mean $\mu = 70$, and standard deviation $\sigma = 16$; find
   (a) $P(38 \leq x \leq 46)$
   (b) $P(62 \leq x \leq 86)$

```
> #1code
> #a)p(38<=x<=46)
> a=pnorm(46,70,16)-pnorm(38,70,16)
> a
[1] 0.04405707
> #b)p(62<=x<=86)
> b=pnorm(86,70,16)-pnorm(62,70,16)
> b
[1] 0.5328072
>
```



2. 600 students appeared in an examination, and it is found that the mean of test 46 and standard deviation is 7. It is assumed that the distribution follows the normal distribution, then find the followings:
   (i) How many students marks lies between 35 to 50.
   (ii) How many students get 50.
   (iii) How many students get below 30

```
> #2code

> #tot=600,mean=46,sd=7

> s=seq(1,600,by=1)

> m=rnorm(600,46,7)

>

> sum(m<50 & m>35)

[1] 390

> sum(m==50)

[1] 0

> sum(m<30)

[1] 6

>
```



3. Create a sequence of numbers between -15 and 15 incrementing by 0.1.
   Let the mean be 2 and standard deviation is 0.5 visualize the normal curve for the above sequence.

```
> #3
> a=seq(-15,15,by=0.1)
> dnorm(a, 2, 0.5)
  [1] 7.581053e-252 6.671847e-249 5.641452e-246
  [4] 4.583149e-243 3.577381e-240 2.682839e-237
  [7] 1.933091e-234 1.338253e-231 8.901279e-229
 [10] 5.688461e-226 3.492733e-223 2.060460e-220
 [13] 1.167861e-217 6.359843e-215 3.327590e-212
 [16] 1.672790e-209 8.079443e-207 3.749294e-204
 [19] 1.671652e-201 7.160946e-199 2.947292e-196
 [22] 1.165478e-193 4.428059e-191 1.616408e-188
 [25] 5.669132e-186 1.910339e-183 6.184898e-181
 [28] 1.923902e-178 5.749915e-176 1.651080e-173
 [31] 4.555155e-171 1.207442e-168 3.075090e-166
 [34] 7.524497e-164 1.768990e-161 3.995779e-159
 [37] 8.671729e-157 1.808166e-154 3.622422e-152
 [40] 6.972491e-150 1.289452e-147 2.291135e-145
 [43] 3.911328e-143 6.415435e-141 1.011012e-138
 [46] 1.530786e-136 2.226901e-134 3.112546e-132
 [49] 4.179831e-130 5.392993e-128 6.685429e-126
 [52] 7.962637e-124 9.111980e-122 1.001836e-119
 [55] 1.058301e-117 1.074112e-115 1.047414e-113
 [58] 9.813304e-112 8.833655e-110 7.640008e-108
 [61] 6.348563e-106 5.068568e-104 3.887974e-102
```

[64] 2.865429e-100 2.029010e-98 1.380406e-96

[67] 9.023141e-95 5.666787e-93 3.419356e-91

[70] 1.982348e-89 1.104190e-87 5.909296e-86

[73] 3.038477e-84 1.501082e-82 7.124939e-81

[76] 3.249272e-79 1.423702e-77 5.993501e-76

[79] 2.424210e-74 9.420804e-73 3.517499e-71

[82] 1.261851e-69 4.349213e-68 1.440262e-66

[85] 4.582477e-65 1.400836e-63 4.114365e-62

[88] 1.161038e-60 3.147880e-59 8.200081e-58

[91] 2.052326e-56 4.935178e-55 1.140217e-53

[94] 2.531048e-52 5.398107e-51 1.106142e-49

[97] 2.177752e-48 4.119402e-47 7.486661e-46

[100] 1.307285e-44 2.193213e-43 3.535245e-42

[103] 5.475028e-41 8.146695e-40 1.164675e-38

[106] 1.599766e-37 2.111233e-36 2.676974e-35

[109] 3.261221e-34 3.817198e-33 4.292767e-32

[112] 4.638294e-31 4.815122e-30 4.802691e-29

[115] 4.602461e-28 4.237639e-27 3.748745e-26

[118] 3.186222e-25 2.601923e-24 2.041461e-23

[121] 1.538920e-22 1.114600e-21 7.756224e-21

[124] 5.185729e-20 3.331176e-19 2.055955e-18

[127] 1.219152e-17 6.945925e-17 3.802163e-16

[130] 1.999676e-15 1.010454e-14 4.905711e-14

[133] 2.288313e-13 1.025551e-12 4.415980e-12

[136] 1.826944e-11 7.261923e-11 2.773360e-10

[139] 1.017628e-09 3.587568e-09 1.215177e-08

[142] 3.954639e-08 1.236524e-07 3.714724e-07

[145] 1.072207e-06 2.973439e-06 7.922598e-06

[148] 2.028170e-05 4.988494e-05 1.178861e-04

[151] 2.676605e-04 5.838939e-04 1.223804e-03

[154] 2.464438e-03 4.768176e-03 8.863697e-03

[157] 1.583090e-02 2.716594e-02 4.478906e-02

[160] 7.094919e-02 1.079819e-01 1.579003e-01

[163] 2.218417e-01 2.994549e-01 3.883721e-01

[166] 4.839414e-01 5.793831e-01 6.664492e-01

[169] 7.365403e-01 7.820854e-01 7.978846e-01

[172] 7.820854e-01 7.365403e-01 6.664492e-01

[175] 5.793831e-01 4.839414e-01 3.883721e-01

[178] 2.994549e-01 2.218417e-01 1.579003e-01

[181] 1.079819e-01 7.094919e-02 4.478906e-02

[184] 2.716594e-02 1.583090e-02 8.863697e-03

[187] 4.768176e-03 2.464438e-03 1.223804e-03

[190] 5.838939e-04 2.676605e-04 1.178861e-04

[193] 4.988494e-05 2.028170e-05 7.922598e-06

[196] 2.973439e-06 1.072207e-06 3.714724e-07

[199] 1.236524e-07 3.954639e-08 1.215177e-08

[202] 3.587568e-09 1.017628e-09 2.773360e-10

[205] 7.261923e-11 1.826944e-11 4.415980e-12

[208] 1.025551e-12 2.288313e-13 4.905711e-14

[211] 1.010454e-14 1.999676e-15 3.802163e-16

[214] 6.945925e-17 1.219152e-17 2.055955e-18

[217] 3.331176e-19 5.185729e-20 7.756224e-21

[220] 1.114600e-21 1.538920e-22 2.041461e-23

[223] 2.601923e-24 3.186222e-25 3.748745e-26

[226] 4.237639e-27 4.602461e-28 4.802691e-29

[229] 4.815122e-30 4.638294e-31 4.292767e-32

[232] 3.817198e-33 3.261221e-34 2.676974e-35

[235] 2.111233e-36 1.599766e-37 1.164675e-38

[238] 8.146695e-40 5.475028e-41 3.535245e-42

[241] 2.193213e-43 1.307285e-44 7.486661e-46

[244] 4.119402e-47 2.177752e-48 1.106142e-49

[247] 5.398107e-51 2.531048e-52 1.140217e-53

[250] 4.935178e-55 2.052326e-56 8.200081e-58

[253] 3.147880e-59 1.161038e-60 4.114365e-62

[256] 1.400836e-63 4.582477e-65 1.440262e-66

[259] 4.349213e-68 1.261851e-69 3.517499e-71

[262] 9.420804e-73 2.424210e-74 5.993501e-76

[265] 1.423702e-77 3.249272e-79 7.124939e-81

[268] 1.501082e-82 3.038477e-84 5.909296e-86

[271] 1.104190e-87 1.982348e-89 3.419356e-91

[274] 5.666787e-93 9.023141e-95 1.380406e-96

[277] 2.029010e-98 2.865429e-100 3.887974e-102

[280] 5.068568e-104 6.348563e-106 7.640008e-108

[283] 8.833655e-110 9.813304e-112 1.047414e-113

[286] 1.074112e-115 1.058301e-117 1.001836e-119

[289] 9.111980e-122 7.962637e-124 6.685429e-126

[292] 5.392993e-128 4.179831e-130 3.112546e-132

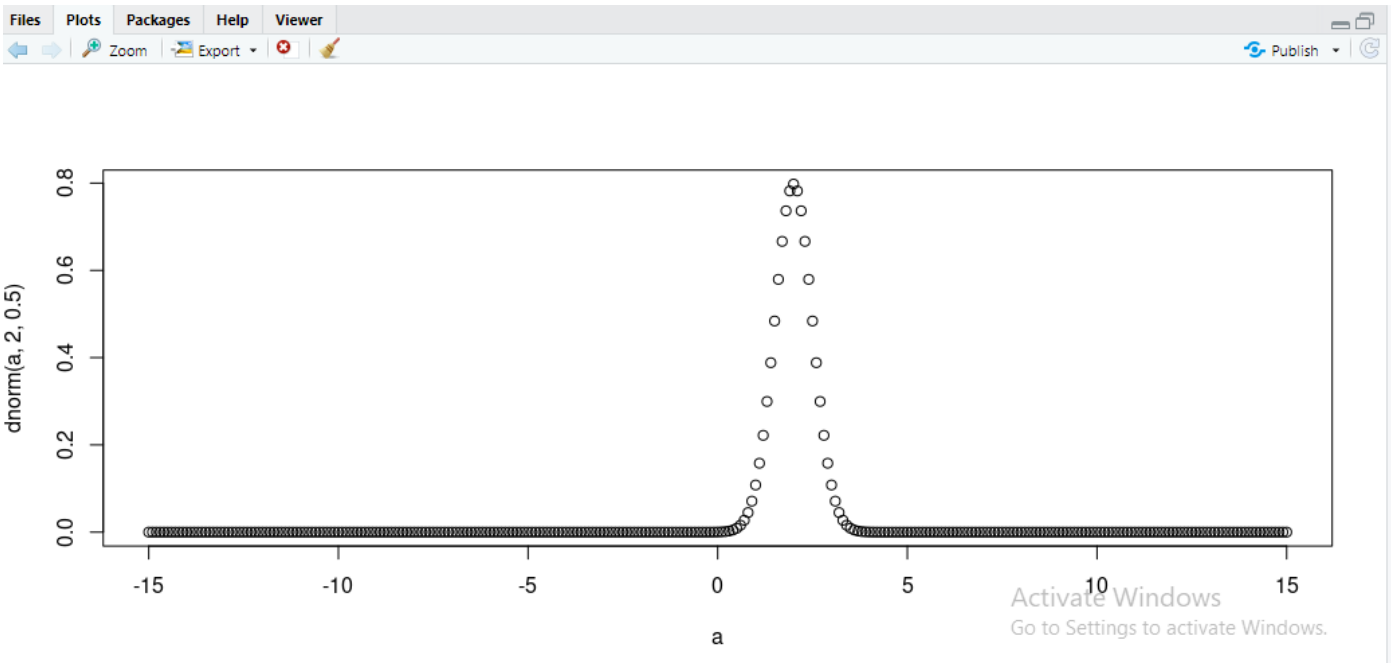
[295] 2.226901e-134 1.530786e-136 1.011012e-138

[298] 6.415435e-141 3.911328e-143 2.291135e-145

[301] 1.289452e-147

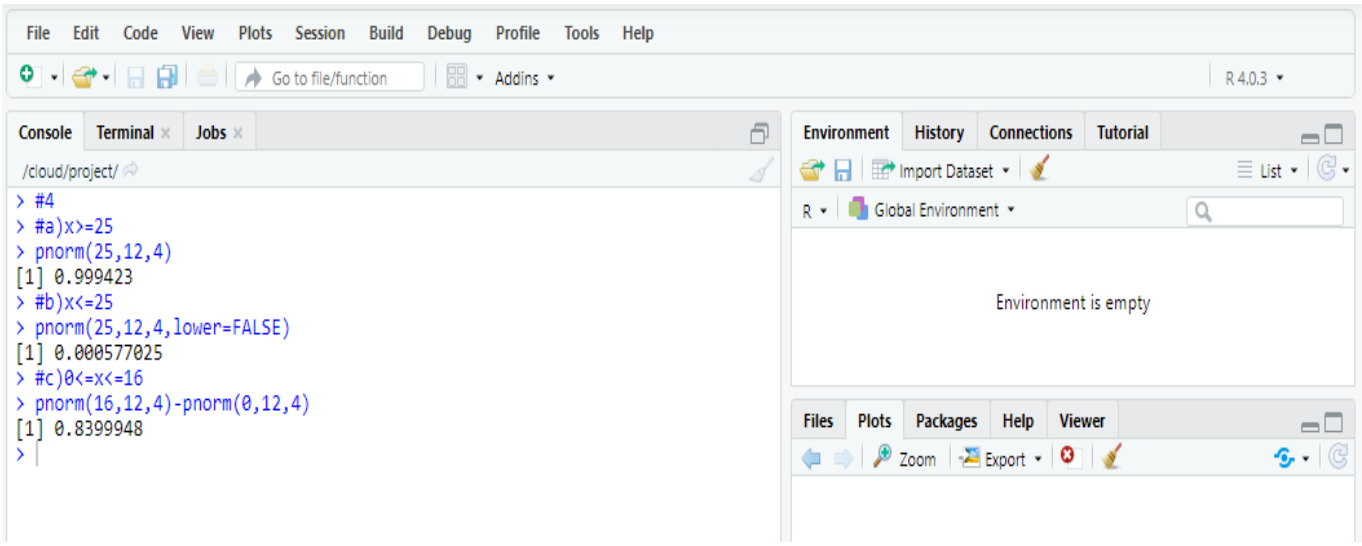
> plot(a,dnorm(a, 2, 0.5))

>



4. Let, X is normally distributed and the mean of X is 12 and S.D. is 4. Find out the probability of the following:
(a) $X \geq 25$, (b) $X \leq 25$ and (c) $0 \leq X \leq 16$.

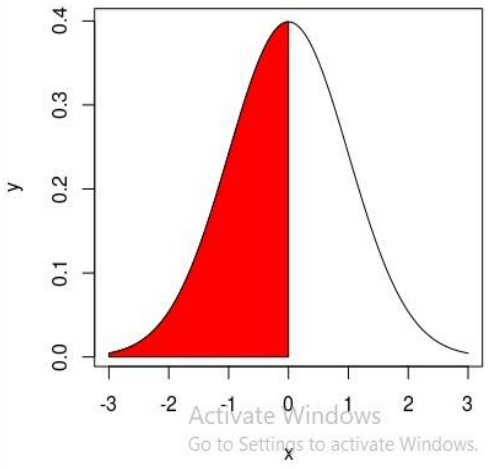
```
> #4
> #a)x>=25
> pnorm(25,12,4)
[1] 0.999423
> #b)x<=25
> pnorm(25,12,4,lower=FALSE)
[1] 0.000577025
> #c)0<=x<=16
> pnorm(16,12,4)-pnorm(0,12,4)
[1] 0.8399948
>
```



5. Create a sequence of 300 numbers with $x = -3$ to 3 with mean 0 and sd=1. Then find the area under the curve to left of the mean. Also, find the area to the left of $x = 2$.

```
> x=seq(-3,3,length=300)
> y=dnorm(x,0,1)
>
> plot(x, y, type = "l")
> x = seq(-3, 0, length = 300)
> y = dnorm(x, 0, 1)
> polygon(c(-3, x, 0), c(0, y, 0), col = "red")
> pnorm(0, 0, 1)
[1] 0.5
> x = seq(-3, 2, length = 300)
> y = dnorm(x, 0, 1)
> polygon(c(-3, x, 2), c(0, y, 0), col = "red")
> pnorm(2, 0, 1)
[1] 0.9772499
>
```

```
> x=seq(-3,3,length=300)
> y=dnorm(x,0,1)
>
> plot(x, y, type = "l")
> x = seq(-3, 0, length = 300)
> y = dnorm(x, 0, 1)
> polygon(c(-3, x, 0), c(0, y, 0), col = "red")
> pnorm(0, 0, 1)
[1] 0.5
> x = seq(-3, 2, length = 300)
> y = dnorm(x, 0, 1)
>
```



Activate Windows
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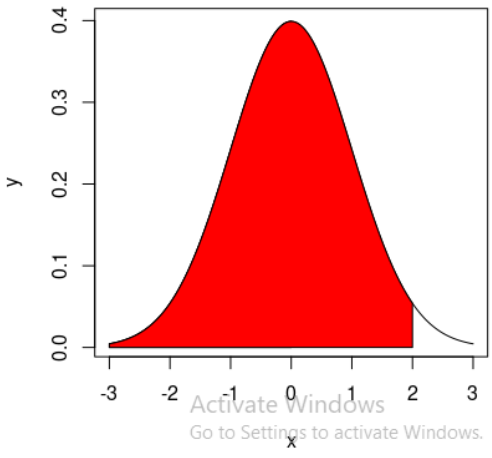
```
> x=seq(-3,3,length=300)
> y=dnorm(x,0,1)
>
> plot(x, y, type = "l")
> x = seq(-3, 0, length = 300)
> y = dnorm(x, 0, 1)
> polygon(c(-3, x, 0), c(0, y, 0), col = "red")
> pnorm(0, 0, 1)
[1] 0.5
> x = seq(-3, 2, length = 300)
> y = dnorm(x, 0, 1)
> polygon(c(-3, x, 2), c(0, y, 0), col = "red")
> pnorm(2, 0, 1)
[1] 0.9772499
>
```



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