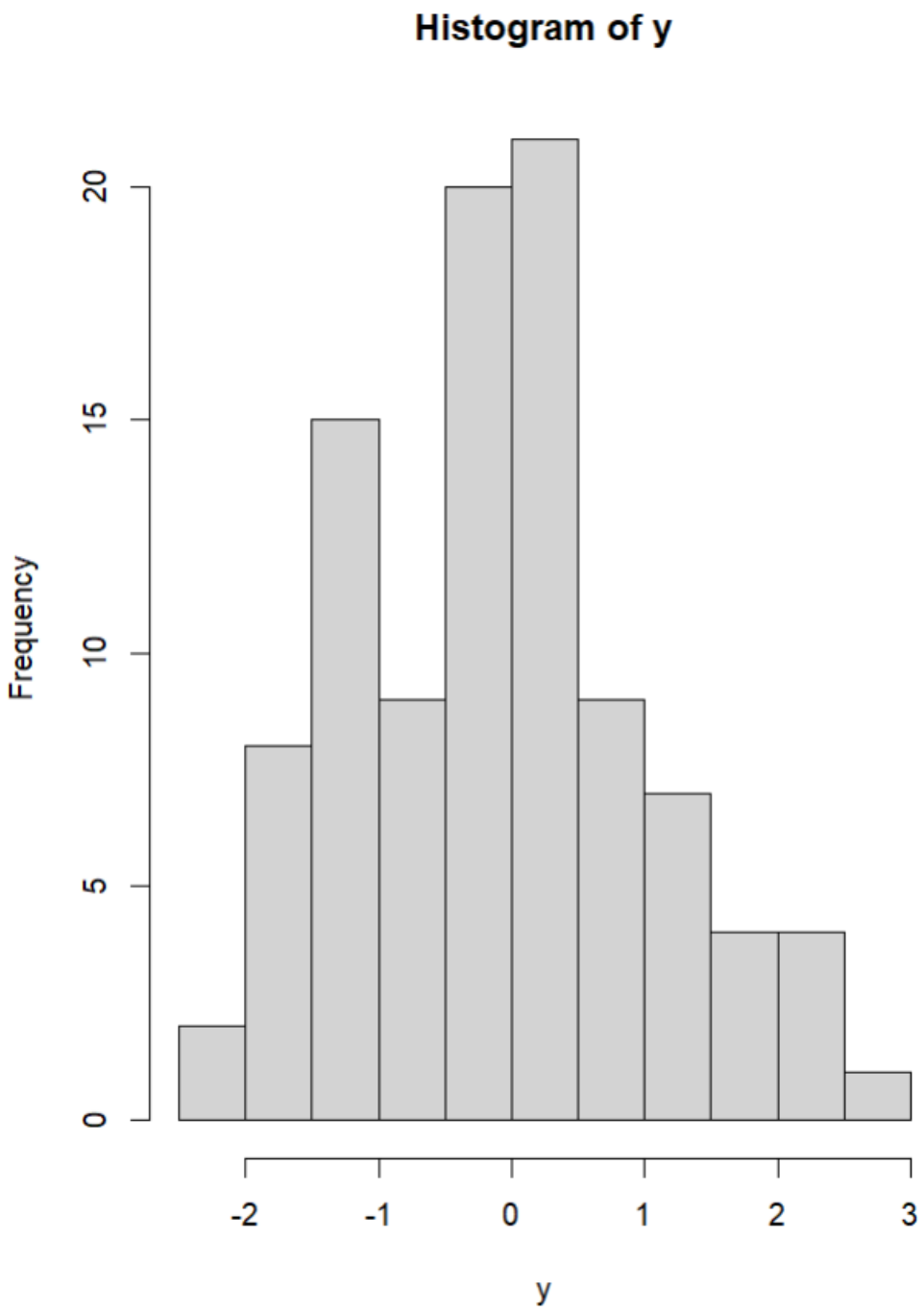
ASSIGNMENT-7

Question-1).

```
#Q1
n=100
df=n-1
y=rt(n,df)
y
hist(y)
```

```
> #Q1
> n=100
> df=n-1
> y=rt(n,df)
> y
  [1] -1.81294898  0.12336484 -0.37425981  0.30760263 -0.04278810 -1.28353122  1.02580735  1.18981859 -0.68361419
 [10]  0.48651007  0.17117469  0.47618235 -1.75191612  0.03832592  0.41132168 -1.35022416 -0.16346006 -0.46525124
 [19]  0.38285385  2.34079802 -0.24036987  2.22319495 -0.54191589 -0.89623882 -2.21029188  2.39527961  0.12705006
 [28]  0.43331501 -1.75302922 -0.58933537 -0.46465167  0.02923453  0.99836359 -0.31480407  0.01796768 -2.03609465
 [37]  0.33287637 -1.23516339  0.39000040 -0.74991825 -1.22945307  1.06638705 -0.07262512  0.01256133  0.76017473
 [46] -0.01486333 -0.34134831 -1.54927654  1.92532420 -1.16595384  0.19724791 -1.29507384 -1.68893351  0.87708684
 [55]  0.67981380 -1.41364547 -0.02638390 -0.94003286 -1.63316430  0.26667471 -0.47880178 -1.15223930 -1.69934334
 [64]  0.18827091 -1.10341041  1.77930035  0.76041467  1.48589126  0.85506891  0.50190122  1.24850379  0.44839513
 [73]  0.23771447  2.01776341 -0.35924599 -0.12186298 -1.37470940  0.60190905 -0.23500576 -1.40432069 -0.32320914
 [82]  1.38807381  1.71825053  0.32088879 -1.45863207 -0.60048123 -0.83805825  2.53645867 -0.29947510 -1.79505870
 [91] -1.01124289  1.72960384  0.90365104 -0.71755720  1.03881738 -0.08030203 -1.22989898 -0.06288180 -0.38650683
[100] -1.24655001
> hist(y)
>
```


Histogram of y
Frequency
0
5
10
15
20
-2
-1
0
1
2
3
y

Question-2).

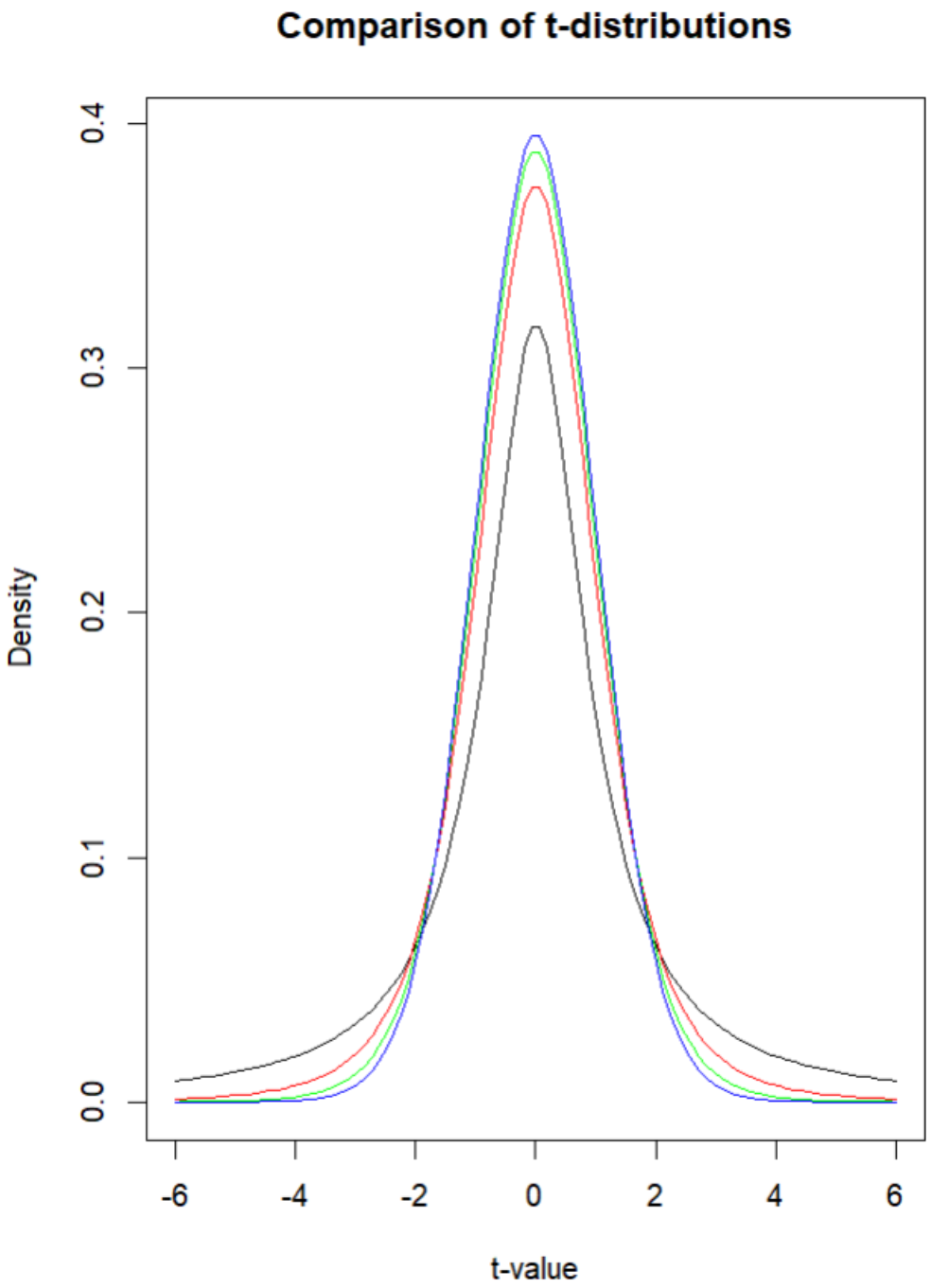
```
# Q2
n <- 100
df <- c(2, 10, 25)
chisqdist <- rchisq(n, df)
print(chisqdist)
```

```
> # Q2
> n <- 100
> df <- c(2, 10, 25)
> chisqdist <- rchisq(n, df)
> print(chisqdist)
  [1]  0.4604786 11.2536971 35.1581456  0.6755761 15.2244642 12.8843163  0.6603360  7.8282681 40.3459707  2.2252820
 [11] 13.8257546 19.1417277  2.8993368  6.4451453 28.5047369  0.8550256 10.4227530 19.5805076  2.6273844  5.7360472
 [21] 18.9145531  3.5427699  4.5791143 19.0046823  1.1574684  8.8159486 29.5439982  0.8407215  9.7026356 19.1183373
 [31]  6.3413774  6.7007129 21.1393455  5.9044503 14.6675955 38.9846908  4.6059128 12.4928490 14.1553618  4.7273787
 [41] 11.4656977 21.4814269  0.1404912 12.4447356 26.1090852  4.0193436 23.7115484 30.3601040  2.3392043  9.7404839
 [51] 32.9985918  0.2170214 11.4621827 31.6178815  3.3461083  8.3123305 25.3680813  0.6205870 11.7549567 30.6448916
 [61]  5.7459424 12.6041763 20.8481907  1.0739419  4.5352197 25.3817812  1.6838612 13.1236101 30.0533400  0.9745618
 [71] 13.9045510 16.0042470 10.0110554  5.7404935 21.8908761  4.0160043  9.7492345 25.1195134  2.0139700  7.4794398
 [81] 18.5998662  6.4237006 13.0318170 25.0375605  0.4829209  3.6938531 23.4711166  3.9288262  7.3970065 38.7584366
 [91]  2.0420677  7.8588382 24.1779364  2.3112445  8.4748354 21.3772306  0.8396459  6.9333156 19.4234102  0.1618092
>
```

Question-3).

```
x <- seq(-6, 6, length = 100)
x
df = c(1,4,10,30)
colour = c("black", "red", "green", "blue")
dt(x,df[1])
dt(x,df[2])
dt(x,df[3])
dt(x,df[4])
plot(x,dt(x,df[4]),type = "l",xlab = "t-value", ylab = "Density",
     main = "Comparison of t-distributions", col=colour[4])
for (i in 1:4){
  lines(x,dt(x,df[i]),type = "l",col = colour[i])
}
```

```
> x <- seq(-6, 6, length = 100)
> x
  [1] -6.00000000 -5.87878788 -5.75757576 -5.63636364 -5.51515152 -5.39393939 -5.27272727 -5.15151515 -5.03030303
 [10] -4.90909091 -4.78787879 -4.66666667 -4.54545455 -4.42424242 -4.30303030 -4.18181818 -4.06060606 -3.93939394
 [19] -3.81818182 -3.69696970 -3.57575758 -3.45454545 -3.33333333 -3.21212121 -3.09090909 -2.96969697 -2.84848485
 [28] -2.72727273 -2.60606061 -2.48484848 -2.36363636 -2.24242424 -2.12121212 -2.00000000 -1.87878788 -1.75757576
 [37] -1.63636364 -1.51515152 -1.39393939 -1.27272727 -1.15151515 -1.03030303 -0.90909091 -0.78787879 -0.66666667
 [46] -0.54545455 -0.42424242 -0.30303030 -0.18181818 -0.06060606  0.06060606  0.18181818  0.30303030  0.42424242
 [55]  0.54545455  0.66666667  0.78787879  0.90909091  1.03030303  1.15151515  1.27272727  1.39393939  1.51515152
 [64]  1.63636364  1.75757576  1.87878788  2.00000000  2.12121212  2.24242424  2.36363636  2.48484848  2.60606061
 [73]  2.72727273  2.84848485  2.96969697  3.09090909  3.21212121  3.33333333  3.45454545  3.57575758  3.69696970
 [82]  3.81818182  3.93939394  4.06060606  4.18181818  4.30303030  4.42424242  4.54545455  4.66666667  4.78787879
 [91]  4.90909091  5.03030303  5.15151515  5.27272727  5.39393939  5.51515152  5.63636364  5.75757576  5.87878788
[100]  6.00000000
> df = c(1,4,10,30)
> colour = c("black", "red", "green", "blue")
> dt(x,df[1])
  [1] 0.008602970 0.008951310 0.009321021 0.009713870 0.010131806 0.010576983 0.011051792 0.011558887 0.012101221
 [10] 0.012682086 0.013305165 0.013974580 0.014694962 0.015471523 0.016310143 0.017217477 0.018201075 0.019269524
 [19] 0.020432624 0.021701588 0.023089287 0.024610541 0.026282468 0.028124906 0.030160921 0.032417419 0.034925891
 [28] 0.037723307 0.040853208 0.044367012 0.048325591 0.052801137 0.057879356 0.063661977 0.070269505 0.077844030
 [37] 0.086551677 0.096583858 0.108155840 0.121499988 0.136849375 0.154405107 0.174278263 0.196396298 0.220368383
 [46] 0.245321632 0.269758339 0.291538659 0.308123970 0.317144983 0.317144983 0.308123970 0.291538659 0.269758339
 [55] 0.245321632 0.220368383 0.196396298 0.174278263 0.154405107 0.136849375 0.121499988 0.108155840 0.096583858
 [64] 0.086551677 0.077844030 0.070269505 0.063661977 0.057879356 0.052801137 0.048325591 0.044367012 0.040853208
 [73] 0.037723307 0.034925891 0.032417419 0.030160921 0.028124906 0.026282468 0.024610541 0.023089287 0.021701588
 [82] 0.020432624 0.019269524 0.018201075 0.017217477 0.016310143 0.015471523 0.014694962 0.013974580 0.013305165
 [91] 0.012682086 0.012101221 0.011558887 0.011051792 0.010576983 0.010131806 0.009713870 0.009321021 0.008951310
[100] 0.008602970
> dt(x,df[2])
  [1] 0.001185854 0.001299674 0.001426572 0.001568291 0.001726840 0.001904535 0.002104055 0.002328498 0.002581463
 [10] 0.002867130 0.003190370 0.003556866 0.003973266 0.004447354 0.004988268 0.005606751 0.006315456 0.007129303
 [19] 0.008065920 0.009146149 0.010394664 0.011840692 0.013518866 0.015470216 0.017743327 0.020395643 0.023494940
 [28] 0.027120922 0.031366892 0.036341391 0.042169621 0.048994381 0.056976082 0.066291261 0.077128754 0.089682498
 [37] 0.104139687 0.120662946 0.139365306 0.160277437 0.183307807 0.208198657 0.234483644 0.261456453 0.288162552
 [46] 0.313426933 0.335927310 0.354313737 0.367362749 0.374140500 0.374140500 0.367362749 0.354313737 0.335927310
 [55] 0.313426933 0.288162552 0.261456453 0.234483644 0.208198657 0.183307807 0.160277437 0.139365306 0.120662946
 [64] 0.104139687 0.089682498 0.077128754 0.066291261 0.056976082 0.048994381 0.042169621 0.036341391 0.031366892
 [73] 0.027120922 0.023494940 0.020395643 0.017743327 0.015470216 0.013518866 0.011840692 0.010394664 0.009146149
 [82] 0.008065920 0.007129303 0.006315456 0.005606751 0.004988268 0.004447354 0.003973266 0.003556866 0.003190370
 [91] 0.002867130 0.002581463 0.002328498 0.002104055 0.001904535 0.001726840 0.001568291 0.001426572 0.001299674
[100] 0.001185854
> dt(x,df[3])
  [1] 8.808511e-05 1.049214e-04 1.252258e-04 1.497602e-04 1.794627e-04 2.154911e-04 2.592754e-04 3.125844e-04
  [9] 3.776092e-04 4.570665e-04 5.543283e-04 6.735831e-04 8.200373e-04 1.000165e-03 1.222017e-03 1.495608e-03
 [17] 1.833383e-03 2.250800e-03 2.767036e-03 3.405837e-03 4.196543e-03 5.175295e-03 6.386451e-03 7.884205e-03
 [25] 9.734397e-03 1.201647e-02 1.482550e-02 1.827413e-02 2.249422e-02 2.763790e-02 3.387746e-02 4.140377e-02
 [33] 5.042225e-02 6.114577e-02 7.378367e-02 8.852619e-02 1.055239e-01 1.248621e-01 1.465323e-01 1.704005e-01
 [41] 1.961789e-01 2.234026e-01 2.514189e-01 2.793936e-01 3.063382e-01 3.311623e-01 3.527460e-01 3.700297e-01
 [49] 3.821091e-01 3.883232e-01 3.883232e-01 3.821091e-01 3.700297e-01 3.527460e-01 3.311623e-01 3.063382e-01
 [57] 2.793936e-01 2.514189e-01 2.234026e-01 1.961789e-01 1.704005e-01 1.465323e-01 1.248621e-01 1.055239e-01
 [65] 8.852619e-02 7.378367e-02 6.114577e-02 5.042225e-02 4.140377e-02 3.387746e-02 2.763790e-02 2.249422e-02
 [73] 1.827413e-02 1.482550e-02 1.201647e-02 9.734397e-03 7.884205e-03 6.386451e-03 5.175295e-03 4.196543e-03
 [81] 3.405837e-03 2.767036e-03 2.250800e-03 1.833383e-03 1.495608e-03 1.222017e-03 1.000165e-03 8.200373e-04
 [89] 6.735831e-04 5.543283e-04 4.570665e-04 3.776092e-04 3.125844e-04 2.592754e-04 2.154911e-04 1.794627e-04
 [97] 1.497602e-04 1.252258e-04 1.049214e-04 8.808511e-05
> dt(x,df[4])
  [1] 1.948678e-06 2.742971e-06 3.862943e-06 5.442161e-06 7.668593e-06 1.080643e-05 1.522639e-05 2.144773e-05
  [9] 3.019610e-05 4.248311e-05 5.971486e-05 8.383942e-05 1.175458e-04 1.645301e-04 2.298498e-04 3.203887e-04
 [17] 4.454635e-04 6.176038e-04 8.535416e-04 1.175449e-03 1.612457e-03 2.202481e-03 2.994355e-03 4.050262e-03
 [25] 5.448382e-03 7.285618e-03 9.680204e-03 1.277386e-02 1.673306e-02 2.174888e-02 2.803476e-02 3.582149e-02
 [33] 4.534868e-02 5.685228e-02 7.054761e-02 8.660837e-02 1.051419e-01 1.261628e-01 1.495662e-01 1.751045e-01
 [41] 2.023705e-01 2.307906e-01 2.596315e-01 2.880217e-01 3.149896e-01 3.395167e-01 3.606011e-01 3.773274e-01
 [49] 3.889359e-01 3.948821e-01 3.948821e-01 3.889359e-01 3.773274e-01 3.606011e-01 3.395167e-01 3.149896e-01
 [57] 2.880217e-01 2.596315e-01 2.307906e-01 2.023705e-01 1.751045e-01 1.495662e-01 1.261628e-01 1.051419e-01
 [65] 8.660837e-02 7.054761e-02 5.685228e-02 4.534868e-02 3.582149e-02 2.803476e-02 2.174888e-02 1.673306e-02
 [73] 1.277386e-02 9.680204e-03 7.285618e-03 5.448382e-03 4.050262e-03 2.994355e-03 2.202481e-03 1.612457e-03
 [81] 1.175449e-03 8.535416e-04 6.176038e-04 4.454635e-04 3.203887e-04 2.298498e-04 1.645301e-04 1.175458e-04
 [89] 8.383942e-05 5.971486e-05 4.248311e-05 3.019610e-05 2.144773e-05 1.522639e-05 1.080643e-05 7.668593e-06
 [97] 5.442161e-06 3.862943e-06 2.742971e-06 1.948678e-06
> plot(x,dt(x,df[4]),type = "l",xlab = "t-value", ylab = "Density",
+      main = "Comparison of t-distributions", col=colour[4])
> for (i in 1:4){
+   lines(x,dt(x,df[i]),type = "l",col = colour[i])
+ }
>
```


Comparison of t-distributions
Density
0.0
0.1
0.2
0.3
0.4
-6
-4
-2
0
2
4
6
t-value

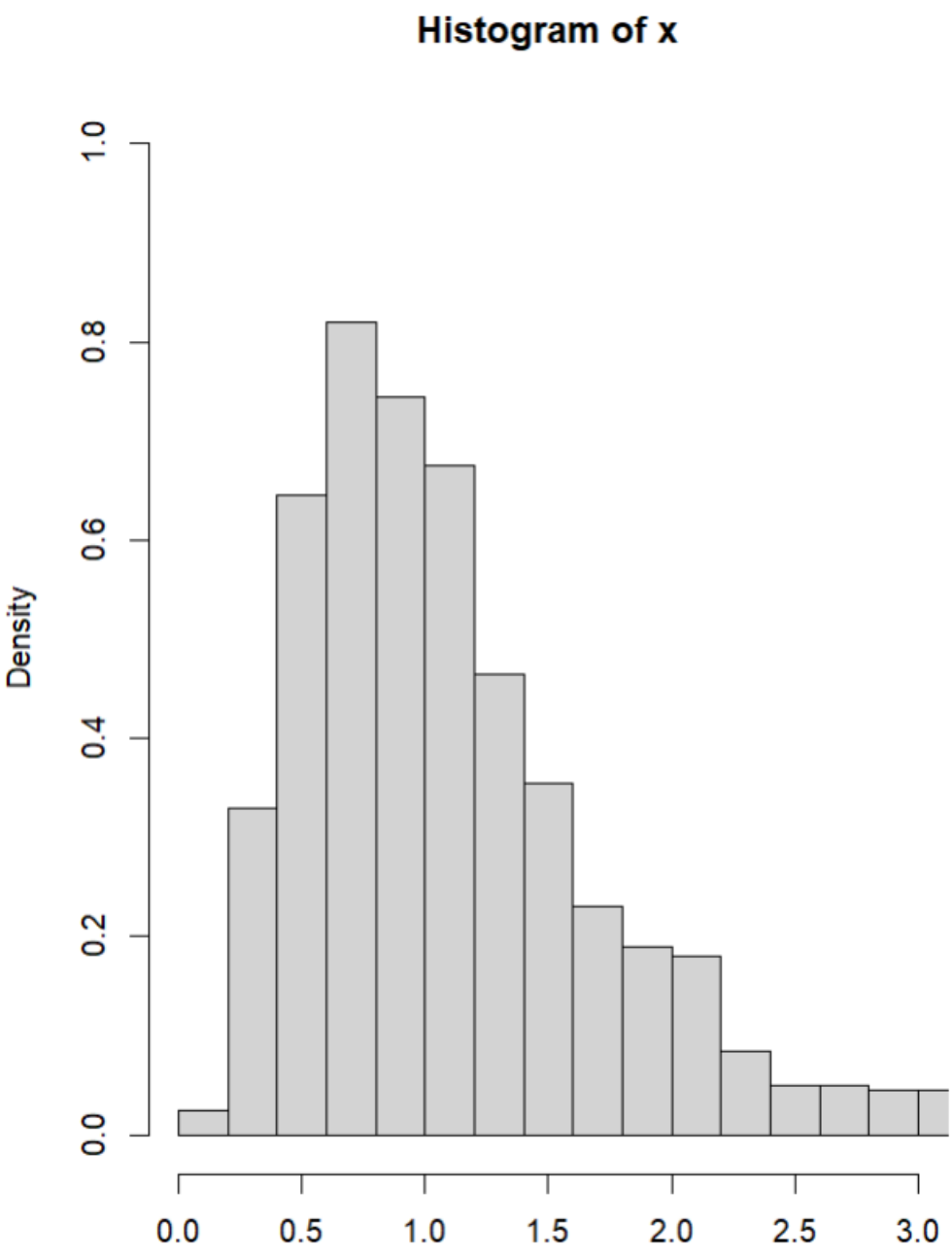
Question-4)

```r
#Q4

#(i)
qf(.95, df1=10, df2=20)
#(ii)
x = 1.5
v1 = 10
v2 = 20
pf(x, df = v1, df2 = v2, lower.tail = TRUE)
pf(x, df = v1, df2 = v2, lower.tail = FALSE)
#(iii)
q <- c(0.25, 0.5, 0.75, 0.999)
v1=10
v2=20
qf(q[1], df1 = v1, df2 = v2, lower.tail = TRUE)
qf(q[2], df1 = v1, df2 = v2, lower.tail = TRUE)
qf(q[3], df1 = v1, df2 = v2, lower.tail = TRUE)
qf(q[4], df1 = v1, df2 = v2, lower.tail = TRUE)

#(iv)
x <- rf(1000, df1 = 10, df2 = 20)
hist(x,
     breaks='scott',
     freq = FALSE,
     xlim = c(0,3),
     ylim = c(0,1),
     xlab = '',
)
```

```
> #(i)
> qf(.95, df1=10, df2=20)
[1] 2.347878
> #(ii)
> x = 1.5
> v1 = 10
> v2 = 20
> pf(x, df = v1, df2 = v2, lower.tail = TRUE)
[1] 0.7890535
> pf(x, df = v1, df2 = v2, lower.tail = FALSE)
[1] 0.2109465
> #(iii)
> q <- c(0.25, 0.5, 0.75, 0.999)
> v1=10
> v2=20
> qf(q[1], df1 = v1, df2 = v2, lower.tail = TRUE)
[1] 0.6563936
> qf(q[2], df1 = v1, df2 = v2, lower.tail = TRUE)
[1] 0.9662639
> qf(q[3], df1 = v1, df2 = v2, lower.tail = TRUE)
[1] 1.399487
> qf(q[4], df1 = v1, df2 = v2, lower.tail = TRUE)
[1] 5.075246
>
> #(iv)
> x <- rf(1000, df1 = 10, df2 = 20)
> hist(x,
+      breaks='scott',
+      freq = FALSE,
+      xlim = c(0,3),
+      ylim = c(0,1),
+      xlab = '',
+ )
>
```


Histogram of x
Density
0.0
0.2
0.4
0.6
0.8
1.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0