ASSIGNMENT 7

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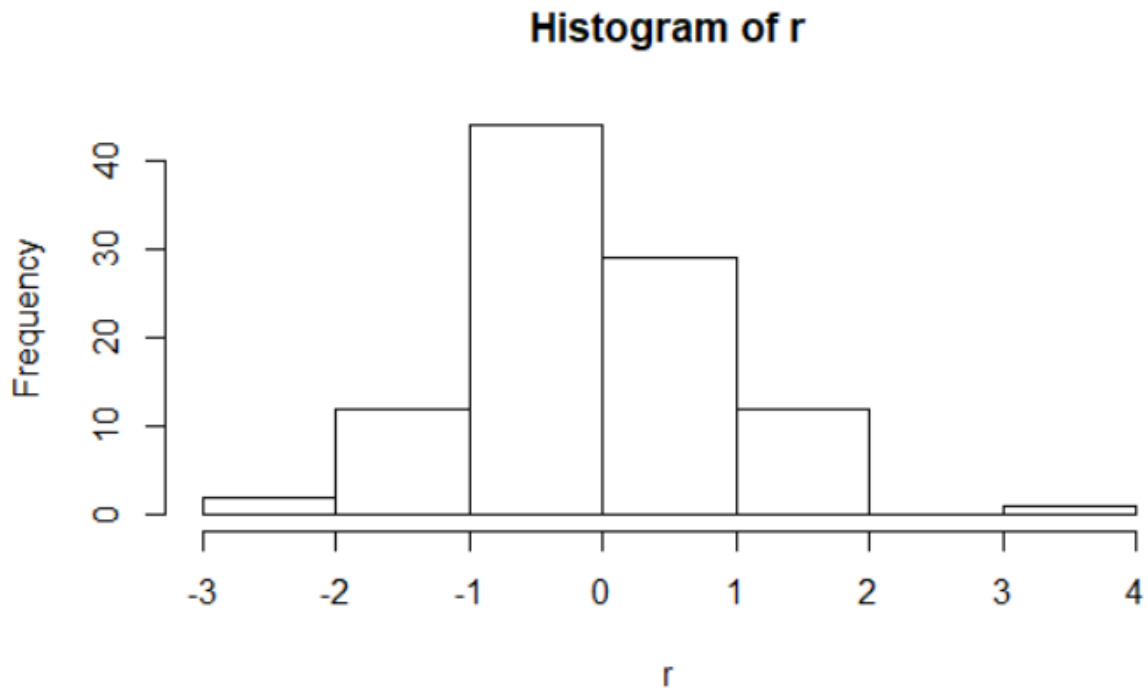
Q1

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



Q2

```
#q2
n=100
df=c(2,10,25)
rchisq(n,df[1])
rchisq(n,df[2])
rchisq(n,df[3])
```

```
> #q2
> n=100
> df=c(2,10,25)
> rchisq(n,df[1])
  [1] 0.923771602 4.937222368 3.304023744 0.238729927 0.005935674 0.2
02298450
  [7] 0.980989854 1.934337236 0.539117795 0.879880378 2.379491380 0.0
18232061
 [13] 0.106936560 3.769086189 0.030223132 2.634400299 0.585600996 0.2
74267457
 [19] 1.179803094 0.895687608 5.000395439 0.228403989 3.633148060 2.2
66829429
 [25] 0.029102909 0.085226551 1.669035227 3.720232149 0.439166769 1.0
58634735
 [31] 3.361783468 2.469444486 2.482446519 0.056791010 1.471576494 0.7
58432329
 [37] 1.567302207 1.692443605 0.514090555 0.190567570 2.874676477 0.2
88729370
 [43] 2.635030286 3.010634762 1.473190096 0.020700050 2.220541039 0.6
02301209
 [49] 4.836959125 0.436447911 0.849683093 2.010757736 0.254146243 5.9
06453206
 [55] 0.103528693 1.488751078 0.831363290 2.395364567 0.107710415 1.6
12332039
 [61] 2.030702414 1.434142617 1.752371101 1.686760428 2.464626143 0.1
98176416
 [67] 0.826054018 1.230383008 3.219540126 2.739342414 0.382173237 0.9
29657962
 [73] 2.275943347 0.482978333 1.662858374 0.642221983 0.044257179 1.5
39280659
 [79] 2.302628435 7.725163697 5.292904714 0.835466745 0.054649074 4.1
25617924
 [85] 0.603117331 2.518399150 2.740446665 0.677479024 0.586522507 0.8
55879036
 [91] 3.902052182 1.554198090 6.173838350 2.061764363 3.750377962 2.8
24715574
 [97] 0.324750225 0.043267962 0.168911675 8.023482595
```

```
> rchisq(n,df[2])
  [1]  4.407784  7.816397  7.574990 10.958211  9.797059 12.990804  7.
628646
  [8]  4.713864  4.503527  7.652037 16.895092 10.329521  4.255199  7.
956842
 [15] 10.051261  3.592930 11.186062  8.611479  9.160046  7.494815  6.
059460
 [22]  6.326967  6.482614  3.887636  9.349003 11.129418 11.282247 10.
810013
 [29] 11.730665 10.454964  3.551727 15.547275  8.623914 11.542654  6.
622994
 [36]  4.580586  5.625034  2.302013 15.289314  8.242959  7.061797 20.
183312
 [43]  4.629894  7.035864 14.510794 13.523699 15.452370 15.952803 15.
302136
 [50] 11.135396  3.223824 13.560742 10.798905 11.099171 14.350674  9.
829962
 [57] 13.182521  6.053330 12.338696  9.098920 12.145445 10.597788  7.
884477
 [64] 18.246971 12.288634  9.737379 12.448777  9.938617 16.990772  8.
033680
 [71]  4.534408 14.471260  6.676215  5.287865 11.489219  4.907772  9.
736070
 [78]  3.676021 14.587605  7.832912  7.850473 21.366302 12.152026  6.
894776
 [85] 15.291353 14.158457 14.002112  9.003334  7.510458 17.448304  9.
261990
 [92] 10.251381  7.318224 10.327064  5.370147  5.785145  8.693331  9.
266642
 [99] 15.875303  6.960176
```

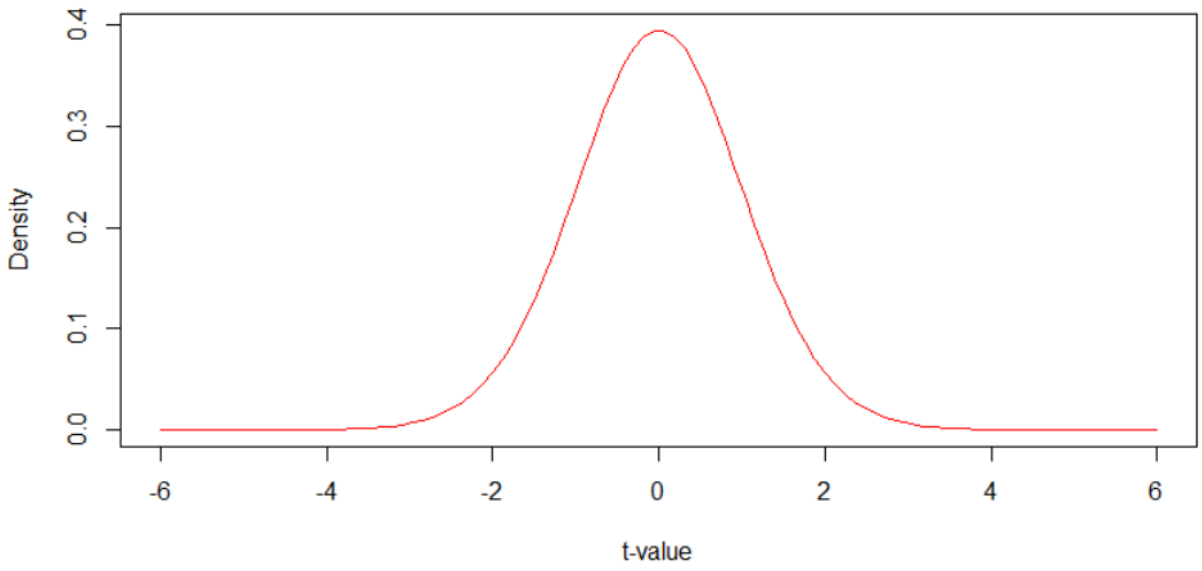
```
> rchisq(n,df[3])
  [1] 19.98291 16.07126 36.09322 20.70548 26.66851 18.60185 23.06803
24.19020
  [9] 16.55843 25.25994 22.12259 25.71072 25.60357 23.07973 34.89022
11.79176
 [17] 27.30171 24.78860 19.55940 19.33850 22.79165 10.23928 18.83726
32.48901
 [25] 22.34904 30.62021 25.55676 19.85140 21.34082 34.98681 19.90351
28.88824
 [33] 29.77309 33.83785 23.70701 30.12744 23.32638 23.88922 22.66831
10.42466
 [41] 19.47217 22.25361 21.04957 21.94453 30.35537 20.11925 28.22162
24.08867
 [49] 32.52570 11.88381 15.21049 17.02126 19.91144 12.85318 31.04943
42.49743
 [57] 15.65466 14.17050 26.12421 25.63792 23.62786 19.43826 17.05228
22.38323
 [65] 23.55715 24.57842 29.69577 30.81850 31.02111 12.60060 25.60171
13.11286
 [73] 21.90503 31.48602 20.94993 23.86586 18.80379 48.89845 31.70476
43.36391
 [81] 14.27722 34.91994 28.18730 20.18239 22.44137 16.25576 20.72967
27.64788
 [89] 27.40631 26.70648 18.82645 32.61910 19.22420 37.21902 36.39341
22.14332
 [97] 26.30502 18.14008 38.78884 19.72175
```

Q3

```
#Q3
x<-seq(-6,6,length=100)
df<-c(1,4,10,30)
dt(x,df[1])
dt(x,df[2])
dt(x,df[3])
dt(x,df[4])
colour<-c('black','yellow','green','red')
plot(x,dt(x,df[4]),type = 'l',xlab="t-value",ylab="Density",col=colour[4])
for (i in 1:3){
  lines(x,dt(x,df[i]),type = "l",col=colours[i])
}
```

```
> #Q3
> x<-seq(-6,6,length=100)
> df<-c(1,4,10,30)
> dt(x,df[1])
  [1] 0.008602970 0.008951310 0.009321021 0.009713870 0.010131806 0.010576983 0.011051792
  [8] 0.011558887 0.012101221 0.012682086 0.013305165 0.013974580 0.014694962 0.015471523
 [15] 0.016310143 0.017217477 0.018201075 0.019269524 0.020432624 0.021701588 0.023089287
 [22] 0.024610541 0.026282468 0.028124906 0.030160921 0.032417419 0.034925891 0.037723307
 [29] 0.040853208 0.044367012 0.048325591 0.052801137 0.057879356 0.063661977 0.070269505
 [36] 0.077844030 0.086551677 0.096583858 0.108155840 0.121499988 0.136849375 0.154405107
 [43] 0.174278263 0.196396298 0.220368383 0.245321632 0.269758339 0.291538659 0.308123970
 [50] 0.317144983 0.317144983 0.308123970 0.291538659 0.269758339 0.245321632 0.220368383
 [57] 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
 [71] 0.044367012 0.040853208 0.037723307 0.034925891 0.032417419 0.030160921 0.028124906
 [78] 0.026282468 0.024610541 0.023089287 0.021701588 0.020432624 0.019269524 0.018201075
 [85] 0.017217477 0.016310143 0.015471523 0.014694962 0.013974580 0.013305165 0.012682086
 [92] 0.012101221 0.011558887 0.011051792 0.010576983 0.010131806 0.009713870 0.009321021
 [99] 0.008951310 0.008602970
> dt(x,df[2])
  [1] 0.001185854 0.001299674 0.001426572 0.001568291 0.001726840 0.001904535 0.002104055
  [8] 0.002328498 0.002581463 0.002867130 0.003190370 0.003556866 0.003973266 0.004447354
 [15] 0.004988268 0.005606751 0.006315456 0.007129303 0.008065920 0.009146149 0.010394664
 [22] 0.011840692 0.013518866 0.015470216 0.017743327 0.020395643 0.023494940 0.027120922
 [29] 0.031366892 0.036341391 0.042169621 0.048994381 0.056976082 0.066291261 0.077128754
 [36] 0.089682498 0.104139687 0.120662946 0.139365306 0.160277437 0.183307807 0.208198657
 [43] 0.234483644 0.261456453 0.288162552 0.313426933 0.335927310 0.354313737 0.367362749
 [50] 0.374140500 0.374140500 0.367362749 0.354313737 0.335927310 0.313426933 0.288162552
 [57] 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
 [71] 0.036341391 0.031366892 0.027120922 0.023494940 0.020395643 0.017743327 0.015470216
 [78] 0.013518866 0.011840692 0.010394664 0.009146149 0.008065920 0.007129303 0.006315456
 [85] 0.005606751 0.004988268 0.004447354 0.003973266 0.003556866 0.003190370 0.002867130
 [92] 0.002581463 0.002328498 0.002104055 0.001904535 0.001726840 0.001568291 0.001426572
 [99] 0.001299674 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
  [7] 2.592754e-04 3.125844e-04 3.776092e-04 4.570665e-04 5.543283e-04 6.735831e-04
 [13] 8.200373e-04 1.000165e-03 1.222017e-03 1.495608e-03 1.833383e-03 2.250800e-03
 [19] 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
 [31] 3.387746e-02 4.140377e-02 5.042225e-02 6.114577e-02 7.378367e-02 8.852619e-02
 [37] 1.055239e-01 1.248621e-01 1.465323e-01 1.704005e-01 1.961789e-01 2.234026e-01
 [43] 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
 [55] 3.311623e-01 3.063382e-01 2.793936e-01 2.514189e-01 2.234026e-01 1.961789e-01
 [61] 1.704005e-01 1.465323e-01 1.248621e-01 1.055239e-01 8.852619e-02 7.378367e-02
 [67] 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
 [79] 5.175295e-03 4.196543e-03 3.405837e-03 2.767036e-03 2.250800e-03 1.833383e-03
 [85] 1.495608e-03 1.222017e-03 1.000165e-03 8.200373e-04 6.735831e-04 5.543283e-04
 [91] 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
  [7] 1.522639e-05 2.144773e-05 3.019610e-05 4.248311e-05 5.971486e-05 8.383942e-05
 [13] 1.175458e-04 1.645301e-04 2.298498e-04 3.203887e-04 4.454635e-04 6.176038e-04
 [19] 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
 [31] 2.803476e-02 3.582149e-02 4.534868e-02 5.685228e-02 7.054761e-02 8.660837e-02
 [37] 1.051419e-01 1.261628e-01 1.495662e-01 1.751045e-01 2.023705e-01 2.307906e-01
 [43] 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
 [55] 3.395167e-01 3.149896e-01 2.880217e-01 2.596315e-01 2.307906e-01 2.023705e-01
 [61] 1.751045e-01 1.495662e-01 1.261628e-01 1.051419e-01 8.660837e-02 7.054761e-02
 [67] 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
 [79] 2.202481e-03 1.612457e-03 1.175449e-03 8.535416e-04 6.176038e-04 4.454635e-04
 [85] 3.203887e-04 2.298498e-04 1.645301e-04 1.175458e-04 8.383942e-05 5.971486e-05
 [91] 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
```



Q4

4a

```
#Q4
qf(0.95,df1=10,df2=20)
```

```
Error in colours[1] : object of type 'closure' i
> #Q4
> qf(0.95,df1=10,df2=20)
[1] 2.347878
```

4b

```
p1<-pf(1.5,10,20,lower.tail = TRUE)
p1
```

```
> p1<-pf(1.5,10,20,lower.tail = TRUE)
> p1
[1] 0.7890535
```

```
p2<-pf(1.5,10,20,lower.tail = FALSE)
p2
p1+p2
```

```
> p2<-pf(1.5,10,20,lower.tail = FALSE)
> p2
[1] 0.2109465
> p1+p2
[1] 1
```

4c

```
#4c
q1<-qf(0.25,10,20)
q1
q2<-qf(0.5,10,20)
q2
q3<-qf(0.75,10,20)
q3
q4<-qf(0.999,10,20)
q4
q1+q2+q3+q4
```

```
> #4c
> q1<-qf(0.25,10,20)
> q1
[1] 0.6563936
> q2<-qf(0.5,10,20)
> q2
[1] 0.9662639
> q3<-qf(0.75,10,20)
> q3
[1] 1.399487
> q4<-qf(0.999,10,20)
> q4
[1] 5.075246
> q1+q2+q3+q4
[1] 8.097391
```

4d

```r
#4d
d<-rf(1000,df1=10,df2=20)
hist(d)
```