ex2

Haokang Chen

2024-09-30

```
mostra1 = rchisq(1000, 15)
mostra1
```

```
##    [1]  9.526471  7.516599 15.463459  7.777113 13.853577 10.218726 18.622624
##    [8]  7.388406 13.911968 11.058445 23.163655 14.459736  8.423112 15.097180
##   [15] 17.173349 16.534881  8.478728 16.753810  9.095749 11.929077  8.004717
##   [22] 20.790318 16.264700 12.783539 20.649302 10.640663 17.670791 20.709373
##   [29]  5.978900 22.541636 25.570456 17.776010 17.862912 14.831813 11.390653
##   [36]  3.619050 18.171019  9.101034 14.596620 18.844120 13.779501 20.658920
##   [43] 13.444303 13.951917 15.183985 16.904854 11.899782 11.402018  5.769047
##   [50] 12.952673 13.432802  9.111769 14.306351 13.361544  8.918037 20.514597
##   [57] 29.238265  6.507645 18.425911 20.247963  7.881090 12.083912 17.482885
##   [64] 11.736335 15.007228 16.350602 20.570276 14.261588 18.298275 13.993282
##   [71] 16.475708 13.605767 10.106524  5.084949  7.387191  8.267648 21.084648
##   [78] 21.322425 19.026117 15.437358  8.586078 22.994095  9.505674  8.495852
##   [85]  8.298378 11.115740 19.376973 10.946840 11.085076 16.021163  7.937614
##   [92] 15.088586  7.698090 15.706631 12.576720 13.319471 20.533924 12.621403
##   [99] 19.666451 14.659577 16.351747  6.167146 13.619047  7.939296  7.561987
##  [106] 17.054580 19.389992 13.169082 17.022391 16.545979 10.860004 12.912466
##  [113] 10.418625 12.889671 15.575529 11.750118  9.435243 11.510208 22.381472
##  [120] 16.839128 10.371699 11.163036 22.852088 13.546022 13.087821 19.936828
##  [127] 11.924012 10.392942 11.788357 14.698357 24.373290  9.934918  7.978988
##  [134] 14.272007  8.973940 13.877295 11.502819 10.010599 15.282576 21.114286
##  [141]  9.835804 14.267473 15.929133  6.869661  9.788196 14.108030 23.804023
##  [148] 16.996198 10.816382 16.544122 10.066768  8.779374 23.025740 10.863435
##  [155]  8.243925 15.211653 28.242176 10.217294  5.307130 14.471426 22.040247
##  [162]  9.745161 30.411921 13.878869 12.894784 16.311516 26.097126  4.791574
##  [169] 17.991344 10.878101 28.252754  7.634010  9.968004 10.530647 16.152415
##  [176] 18.910161 11.375696 17.345660 15.637820 18.716041 13.516824 10.919177
##  [183] 17.768466 17.469597 19.202980 15.990428 12.511535 11.095159 18.793407
##  [190] 16.310263 27.162442  9.663541 12.165324 15.047338 16.323287 11.103168
##  [197] 14.586183  5.288185  9.797336 16.625768 15.733525 15.865229 15.887415
##  [204] 11.516140 12.592737 14.381044 10.207538 16.523348 22.392874 13.257778
##  [211] 17.388652 16.776872 13.896075 23.617419 16.121556 31.908027 10.251918
##  [218] 12.690218 12.444566 12.760814 14.442938  8.911084 14.053866 19.263473
##  [225] 22.137389 20.520700 24.242224  9.157252 10.957420 24.467235 10.058423
##  [232] 15.136883 14.847840 14.629656 13.478735 24.015687 17.870618 15.465825
##  [239] 10.895539 11.407777 11.812824  7.402466 11.918756 11.959295 15.710190
##  [246]  6.321607 12.556519 15.917003 14.062010 18.238312 21.953647 13.955251
##  [253]  9.122086 19.881947 12.750396 18.392088 17.063561  8.325263 13.509536
##  [260]  9.471299 17.457392 20.285373 17.526705 14.312979 16.800590 10.423855
##  [267] 14.929392 12.903209  7.559261 12.420475  9.025877 13.088426 13.756664
```

```
##  [274] 20.684942 21.994737  8.115489 17.576229 25.854178 19.323048 14.868717
##  [281] 16.465413 13.915413 12.700211  9.599056  7.508057 18.285991 11.157427
##  [288]  8.639776 14.326105 19.234224  8.479833 13.154023 20.695685 20.113595
##  [295]  9.789683 14.994562 13.536101 10.148330 13.310987 15.948735 16.889074
##  [302] 24.571181  7.256985 23.251974 18.384332 18.444920  9.813991 14.700444
##  [309] 29.529807 12.465020 11.801006 27.573209  6.826604 17.729954  9.470151
##  [316] 15.497642 25.664513 11.149108 29.687052 24.955648 26.478495 19.933427
##  [323] 17.487951 13.948561 19.547007 14.787762 11.924958 17.729511 11.729486
##  [330] 23.269857 10.676407 22.135391 14.833144 11.274010 14.808147 12.921031
##  [337] 10.488882 15.944528  7.184176 18.796471 17.266183 17.679670 15.157804
##  [344] 16.297544 14.247121  6.519713 20.302527 21.737187  8.811800  9.288913
##  [351]  9.337170 26.512467 14.715869 15.745789 15.401177 27.740281  5.222682
##  [358] 16.108628  4.623325 12.867367 16.496873  9.787494 14.298651 16.115011
##  [365] 14.556395 26.235934 29.305219 14.291084 10.485152  9.815507 13.600592
##  [372] 14.008353 14.025628 12.733974 14.495381 11.207209 11.892860 16.146996
##  [379] 18.614543 20.866416 13.832630 25.588160 13.893891 14.102325 10.531373
##  [386]  7.648685 15.933754 34.954472  8.202222 12.524203 13.002670 10.146507
##  [393] 10.695062 10.992540  9.500796 13.937218 17.369304 17.373813 16.295772
##  [400] 11.632017 12.350612 16.168123 25.042259 16.643953 13.969767 12.107230
##  [407] 12.615156 13.632521 17.182064 18.629460 24.242718 12.439840 19.227583
##  [414] 14.177785 16.163832 12.022317 22.876087 11.782833 25.942312 13.957162
##  [421] 23.013253 17.575182 15.168713 20.246255 15.201910 13.128005 11.155383
##  [428] 12.939699 15.064366 11.793535  9.494680 18.614472 15.324070 18.878056
##  [435]  9.262001 13.235238 12.845080 17.788462  7.370235 14.169252 11.481034
##  [442] 13.600421 18.854919 17.828211 18.028490 17.464048 35.138569 17.411627
##  [449]  9.048788 11.173801 19.360381 13.699833 17.631188 17.318314 15.195549
##  [456]  7.107717 11.699649  9.808940 11.207093 11.471186 23.801819  9.599836
##  [463]  7.056173 13.464420  9.929352 16.954573 26.882248  6.887551  8.694751
##  [470] 14.533490 14.427327 15.368864 17.670652 21.718895 20.760278 13.579526
##  [477] 12.449405  9.677214 19.545184 26.447669  7.615670 11.291880  8.476191
##  [484] 15.181805 12.727323 13.297954 10.429601 14.932607 12.171778 18.799900
##  [491] 20.445422 15.942315 11.066132 11.822860 15.617653 11.458376 15.490406
##  [498]  9.214596 18.587905  9.770558 23.672375 10.208221 15.357694 13.291762
##  [505] 11.897638 10.366305 16.870766 17.560823 18.255009 25.694489  7.199211
##  [512] 18.961045 27.362073 13.848399 17.806523 15.520772  6.695942 15.743461
##  [519] 12.477565 20.844822  6.460784 14.725404 17.034323 15.738755 20.750420
##  [526] 16.155453 13.866680 17.452552 13.669915 12.948869 16.440872 14.665685
##  [533] 12.079543  9.388194 14.067356 16.231491 17.398107 15.261052 17.903883
##  [540] 18.630149 25.154193 11.490575 13.249659 22.449153 16.837618 24.361558
##  [547] 13.798426 14.805833 15.898684 14.299404 19.578227 28.371930 16.883761
##  [554] 12.713690 20.111478 12.481177 11.425473 14.267919  4.851237  6.226305
##  [561] 20.293637  9.598237 20.048546 12.309696 19.934696 21.423668 20.784998
##  [568] 11.302470 10.823816 15.758125 12.502962 17.980631 10.500399 14.406084
##  [575] 12.460427 16.976425 17.524849 10.721657 11.979044 10.760431 13.202787
##  [582] 19.291790 19.916806 12.749573 25.674813 11.180219 16.916073 19.407371
##  [589] 11.604541 13.016568 19.649532 12.132873 22.608844  9.232779 12.004857
##  [596] 11.287105 13.050666 19.210527  9.444679 16.233534 12.184336 16.790488
##  [603] 10.861922 12.806098  9.245391  7.944689 12.148169 14.001093 10.918411
##  [610] 16.549952 23.565955 12.512913 21.385197  5.646150 10.211511 14.474341
##  [617] 12.217307  9.648307 11.149484 18.784874 13.673794 10.790464  9.354559
##  [624] 25.409428 12.156407  5.506705 16.925582 16.666903 16.211522 18.297527
##  [631] 10.123145  9.724551 13.801096 20.091635 14.922131 19.069963  9.931360
##  [638] 14.940794 17.235301 15.501155 11.723613 27.513119  9.409850  8.635763
##  [645] 15.426571 14.991350 12.811242 11.897764 18.497936 13.348739 15.801892
```

```
##  [652] 13.539966 13.701613 11.378531 10.446410 15.781806 17.332071 17.205023
##  [659] 17.173705 22.287449 13.166505 10.320784  8.327004  9.635816  3.775051
##  [666] 12.797776 11.327001  9.208447  4.894138 12.727546 16.723409 12.506736
##  [673]  8.170023 22.940774 23.236823 22.709896 18.996734 11.108586 30.275553
##  [680] 21.981957 24.072824 26.484534 18.679880 16.311403  8.368235 18.817437
##  [687]  5.177254 11.925644 12.638223 16.066725 21.863657 17.414061 14.148892
##  [694] 11.865765 12.622781  3.723411 13.248999 20.147581  7.070810 13.835212
##  [701] 10.583311 10.705805 15.840632 17.168963  7.077720  8.391189 13.211602
##  [708] 22.327344 11.871420 21.472818 15.360040 14.948708 20.561018  9.447500
##  [715] 18.163448 18.157245 24.277708  6.658549 14.408291 15.305203 16.457589
##  [722] 17.669637 12.096288 15.733303  6.832458 18.452258 21.655264 13.302584
##  [729] 12.363796 13.464158 20.534270 11.173190 23.037429 16.751904 18.698124
##  [736] 18.481546  7.533748  8.042355 15.716059  9.167886  9.472354 12.655779
##  [743] 17.978184 10.994602 15.664561 21.229407 14.232496  8.203369 26.169082
##  [750]  8.179871 18.055226 20.684738 25.998189  9.738170 24.327899 16.638896
##  [757]  8.366402 18.971198 15.385078 15.221473 17.814031 31.307076 16.975682
##  [764] 24.219184 16.797721  7.953562 18.441656 17.576027  8.269907 21.951817
##  [771] 26.797688  8.972848 21.285863 24.229591 18.295840 17.080493 14.816079
##  [778] 16.117782 15.702463 16.499870 14.705952 19.933696  7.040014 11.348556
##  [785] 16.947286 21.217401 25.291858 30.858502 10.844082 12.485076  7.879182
##  [792] 15.812327 16.021749 18.164209 13.518749 18.448809 16.616825 26.813992
##  [799] 19.769620 17.456454 19.705033  7.885081 13.791631 16.821575 11.124641
##  [806] 15.414827 17.006776 10.678811  8.102163 17.535509  6.023662 12.533706
##  [813] 15.856531 14.903103  9.957985 12.290810 21.553661 18.224291 17.869839
##  [820]  5.032271 17.178833 13.007541 18.787982 13.186814 14.617457 21.137442
##  [827] 17.886925  8.939327  5.217792 16.897738 18.742182 11.625312  4.445507
##  [834] 15.033571 17.855622 13.218011 11.894223 20.489277 16.691928 14.642530
##  [841] 22.372402 13.056667  8.405300 11.302999 16.502027 17.115649 16.883394
##  [848]  9.213646 10.910644 24.404785 11.168435 18.516365  8.393110 14.932162
##  [855] 36.381906  6.252824 18.900071 13.757138 20.882903 17.028980 12.946873
##  [862] 20.524883 11.742402 21.024620 23.659090 13.352240  9.237799 10.766506
##  [869]  9.891241  9.793701 12.465276 21.116039 14.928202 17.918677 15.419984
##  [876] 23.642862 19.512525 14.890978  7.561911 21.929232 11.290457 23.717052
##  [883] 24.362273  7.258416  6.860951 11.989987 19.513847  9.969474 10.748645
##  [890] 32.005033 17.477981 11.563280  8.935371 11.308714 22.426250 20.501458
##  [897] 12.881671 19.944311 15.384933 15.046860  9.757119  5.627746 10.110086
##  [904] 14.187872 14.724699 21.487716 17.426142 10.791553 12.474052  9.895932
##  [911] 17.416761 13.335873  6.708120  9.341221 13.412733 15.210433 10.591173
##  [918] 20.576911 12.181593 13.864800 13.684897 19.341220  9.940815 11.411492
##  [925] 13.715499 25.841172 14.385433 15.834678 16.884034 14.928663 19.411665
##  [932] 14.702142 12.303628 13.558954  8.475661 22.744891 10.783853 16.747002
##  [939] 14.335602 18.270379 17.500304 23.027623  9.218402 15.149525  6.926393
##  [946] 15.088219 12.794510 11.569578 19.899620 11.235647 12.004795  7.217954
##  [953] 13.413690 11.886839 20.384310 11.882328 10.571934 11.046545 13.785814
##  [960] 19.648155 16.764075 12.124998 20.920753 15.853841 10.686697 17.977525
##  [967]  9.595615 20.671225 10.153142 37.402819 17.273604 16.344205 11.216559
##  [974] 11.566467 15.363179  9.528800 21.241813 14.868983 24.649000 19.647160
##  [981]  6.528801 25.384235 12.900644 26.528917 20.083003 22.186782 16.517107
##  [988]  5.935727 17.915458 18.099541 12.200995 14.852753 12.443590 13.045734
##  [995] 14.075821 11.253505  6.993125 19.069988 21.986967 11.299383
```

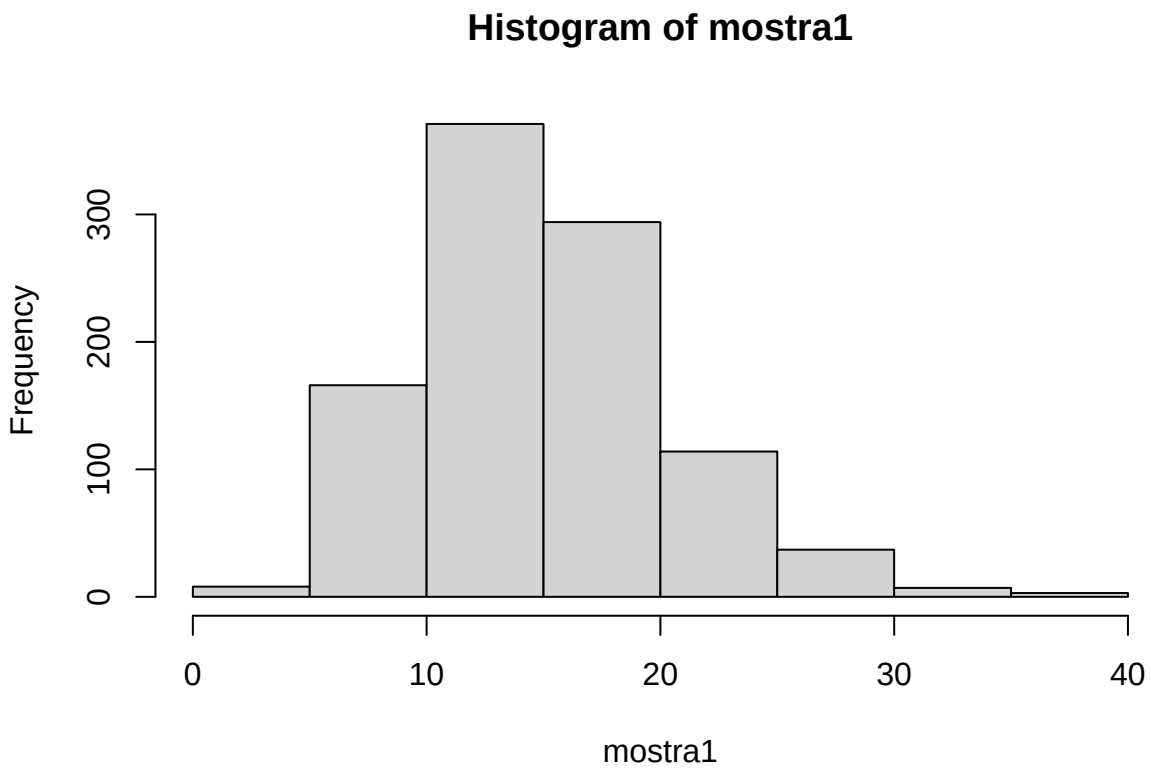
```
mean(mostra1)
```

```
## [1] 14.96652
```

```r
var(mostra1)
```

```
## [1] 27.95628
```

```r
hist(mostra1)
```



Teoricament, $E(x) = n, \quad Var(x) = 2n$

```r
mostra2 = rchisq(10, 50)
mean(mostra2)
```

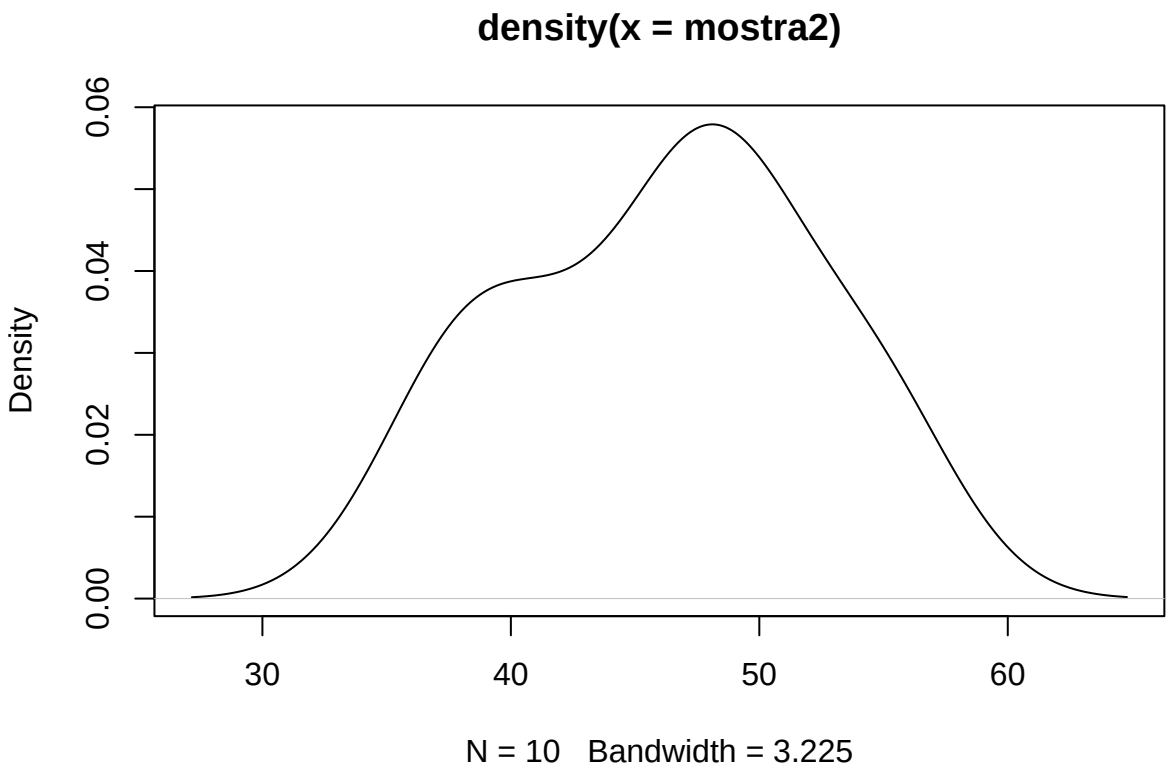
```
## [1] 46.26438
```

```r
var(mostra2)
```

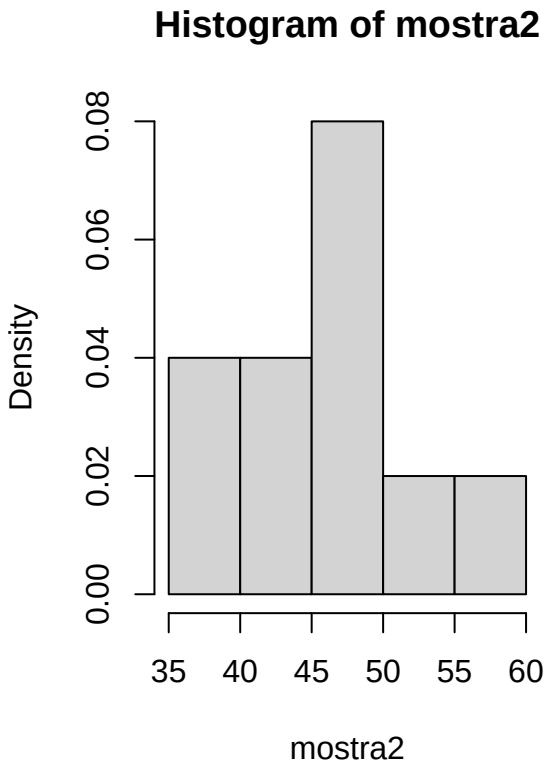
```
## [1] 37.95091
```

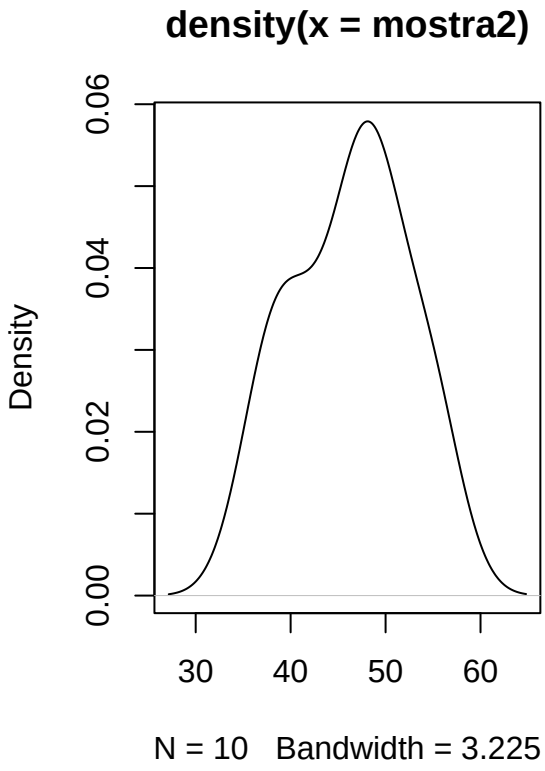
```r
hist(mostra2)
```


```
plot(density(mostra2))
```




```
par(mfrow=c(1,2))
hist(mostra2, prob=T)
plot(density(mostra2))
```






```
pchisq(7.3, 15)
```

```
## [1] 0.051216
```

```
qchisq(1-0.2, 15) #la distribució és per sobre```
```

```
## [1] 19.31066
```