Experiment 13

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Date: December 10, 2021

```r
# To Create a CSV file in Excel with name 'temp' and import this into R
data = read.csv("temp.csv")
attach(data)
```

1. Aim: To Generate tables and apply chisq tests

```r
# (i) 2x2 table for sex and locality.
tab1 = table(sex, locality)
rownames(tab1) = c("Male","Female")
colnames(tab1) = c("Rural","Urban")
tab1
```

```
##         locality
## sex      Rural Urban
##   Male      19    11
##   Female    15     5
```

```r
# Test whether sex distribution is independent of locality
# H_0: Sex distribution is independent of locality.
# H_1: Sex distribution is not independent of locality.
cqt = chisq.test(tab1)
cqt$expected
```

```
##         locality
## sex      Rural Urban
##   Male    20.4   9.6
##   Female  13.6   6.4
```

```r
summary(tab1)
```

```
## Number of cases in table: 50
## Number of factors: 2
## Test for independence of all factors:
##  Chisq = 0.7506, df = 1, p-value = 0.3863
```

H_0 is accepted.

```r
#















#
```

```r
# (ii) Is there any significant association between mutation and religion?
#H_0: There is no significant association between mutation and religion.
#H_1: There is a significant association between mutation and religion.
tab2 = table(mutation, religion)
rownames(tab2) = c("Not Mutated", "Mutated")
colnames(tab2) = c("Hindu","Muslim","Sikh","Christian")
tab2
```

```
##              religion
## mutation      Hindu Muslim Sikh Christian
##   Not Mutated    14      5    3         2
##   Mutated        10     10    3         3
```

```r
cq = chisq.test(tab2)
cq$expected
```

```
##              religion
## mutation      Hindu Muslim Sikh Christian
##   Not Mutated 11.52    7.2 2.88       2.4
##   Mutated     12.48    7.8 3.12       2.6
```

```r
cq
```

```
##
##  Pearson's Chi-squared test
##
## data:  tab2
## X-squared = 2.4573, df = 3, p-value = 0.4831
```

H_0 is accepted.

```r
#














#
```

```r
# (iii) To Test that for age, the population variance is different from 5 i.e



# Also find 95% Confidence Intervals for
(n = length(age))
```

```
## [1] 50
```

```r
(s2 = var(age))
```

```
## [1] 107.6016
```

```r
csq = (n-1)*s2/5
csq  # Calculated Value of Chi Square
```

```
## [1] 1054.496
```

```r
df = n-1
df # degrees of freedom
```

```
## [1] 49
```

```r
# Critical Values
(tab_alp_by2 = qchisq(0.05/2,df))
```

```
## [1] 31.55492
```

```r
(tab_1mnsalp_by2 = qchisq(0.05/2,df,lower.tail = F))
```

```
## [1] 70.22241
```

```r
# H_0 is rejected.
# 95% confidence intervals
c((n-1)*s2/tab_1mnsalp_by2, (n-1)*s2/tab_alp_by2)
```

```
## [1]  75.08258 167.08902
```

```r
#















#
```

2. Aim: To find Chisq pdf values and densities and plot graphs

```r
# (i) Probably density function of Chi-square distribution at

# (a): f(0), with df=5
dchisq(0, 5)
```

```
## [1] 0
```

```r
# (b): f(5), with df=10
dchisq(5, 10)
```

```
## [1] 0.06680094
```

```r
# (c) Generate a sequence x<- seq(0,20,by=.1) and also y<- dchisq(x) with df=5, for Chi-square and then
x = seq(0, 20, by = 0.1)
y = dchisq(x, 5)
x
```

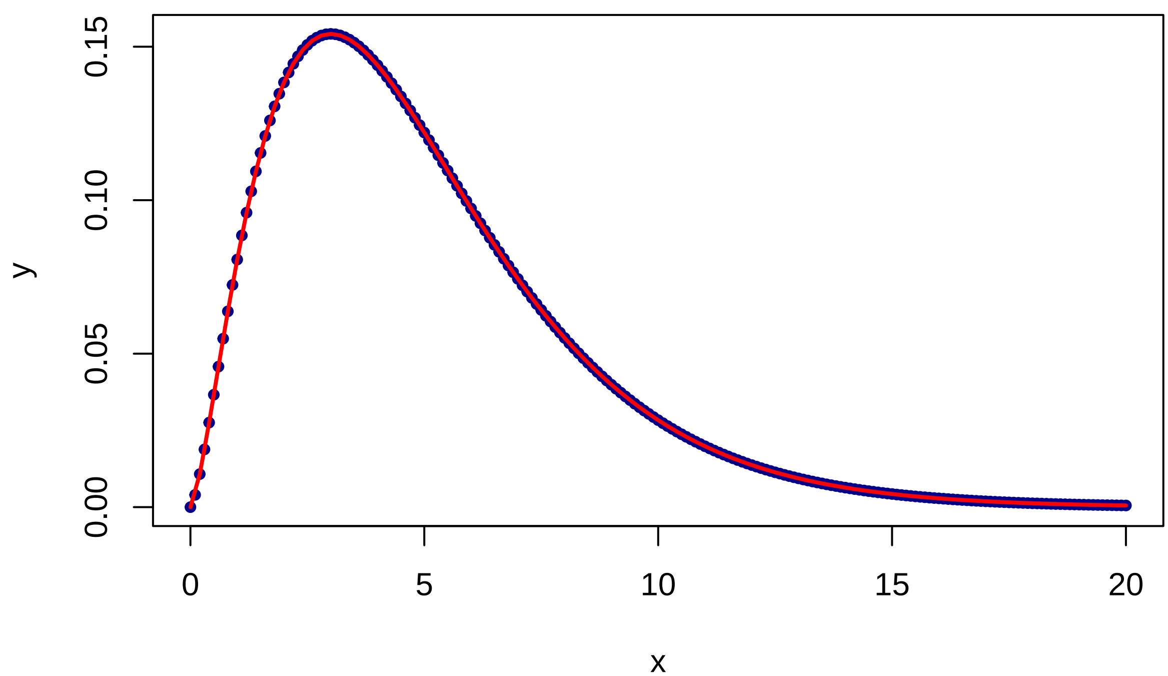
```
##   [1]  0.0  0.1  0.2  0.3  0.4  0.5  0.6  0.7  0.8  0.9  1.0  1.1  1.2  1.3  1.4
##  [16]  1.5  1.6  1.7  1.8  1.9  2.0  2.1  2.2  2.3  2.4  2.5  2.6  2.7  2.8  2.9
##  [31]  3.0  3.1  3.2  3.3  3.4  3.5  3.6  3.7  3.8  3.9  4.0  4.1  4.2  4.3  4.4
##  [46]  4.5  4.6  4.7  4.8  4.9  5.0  5.1  5.2  5.3  5.4  5.5  5.6  5.7  5.8  5.9
##  [61]  6.0  6.1  6.2  6.3  6.4  6.5  6.6  6.7  6.8  6.9  7.0  7.1  7.2  7.3  7.4
##  [76]  7.5  7.6  7.7  7.8  7.9  8.0  8.1  8.2  8.3  8.4  8.5  8.6  8.7  8.8  8.9
##  [91]  9.0  9.1  9.2  9.3  9.4  9.5  9.6  9.7  9.8  9.9 10.0 10.1 10.2 10.3 10.4
## [106] 10.5 10.6 10.7 10.8 10.9 11.0 11.1 11.2 11.3 11.4 11.5 11.6 11.7 11.8 11.9
## [121] 12.0 12.1 12.2 12.3 12.4 12.5 12.6 12.7 12.8 12.9 13.0 13.1 13.2 13.3 13.4
## [136] 13.5 13.6 13.7 13.8 13.9 14.0 14.1 14.2 14.3 14.4 14.5 14.6 14.7 14.8 14.9
## [151] 15.0 15.1 15.2 15.3 15.4 15.5 15.6 15.7 15.8 15.9 16.0 16.1 16.2 16.3 16.4
## [166] 16.5 16.6 16.7 16.8 16.9 17.0 17.1 17.2 17.3 17.4 17.5 17.6 17.7 17.8 17.9
## [181] 18.0 18.1 18.2 18.3 18.4 18.5 18.6 18.7 18.8 18.9 19.0 19.1 19.2 19.3 19.4
## [196] 19.5 19.6 19.7 19.8 19.9 20.0
```

```r
y
```

```
##   [1] 0.0000000000 0.0040001298 0.0107622817 0.0188073030 0.0275435492
##   [6] 0.0366159408 0.0457854347 0.0548823631 0.0637831552 0.0723969147
##  [11] 0.0806569082 0.0885147962 0.0959365267 0.1028993014 0.1093892708
##  [16] 0.1153997421 0.1209297624 0.1259829819 0.1305667323 0.1346912721
##  [21] 0.1383691658 0.1416147687 0.1444437990 0.1468729815 0.1489197489
##  [26] 0.1506019939 0.1519378605 0.1529455716 0.1536432848 0.1540489737
##  [31] 0.1541803298 0.1540546831 0.1536889373 0.1530995188 0.1523023370
##  [36] 0.1513127535 0.1501455603 0.1488149647 0.1473345803 0.1457174229
##  [41] 0.1439759107 0.1421218684 0.1401665341 0.1381205689 0.1359940682
##  [46] 0.1337965754 0.1315370962 0.1292241147 0.1268656096 0.1244690717
##  [51] 0.1220415213 0.1195895265 0.1171192206 0.1146363206 0.1121461451
##  [56] 0.1096536317 0.1071633551 0.1046795438 0.1022060970 0.0997466013
##  [61] 0.0973043467 0.0948823415 0.0924833284 0.0901097982 0.0877640043
##  [66] 0.0854479760 0.0831635317 0.0809122915 0.0786956889 0.0765149827
##  [71] 0.0743712677 0.0722654853 0.0701984335 0.0681707767 0.0661830546
##  [76] 0.0642356908 0.0623290013 0.0604632021 0.0586384167 0.0568546833
##  [81] 0.0551119609 0.0534101365 0.0517490300 0.0501284008 0.0485479523
##  [86] 0.0470073373 0.0455061628 0.0440439939 0.0426203585 0.0412347510
##  [91] 0.0398866357 0.0385754505 0.0373006101 0.0360615088 0.0348575233
##  [96] 0.0336880156 0.0325523351 0.0314498208 0.0303798037 0.0293416085
## [101] 0.0283345553 0.0273579618 0.0264111439 0.0254934180 0.0246041017
```

```
## [106] 0.0237425155 0.0229079831 0.0220998334 0.0213174004 0.0205600247
## [111] 0.0198270540 0.0191178436 0.0184317574 0.0177681681 0.0171264575
## [116] 0.0165060175 0.0159062498 0.0153265669 0.0147663915 0.0142251576
## [121] 0.0137023100 0.0131973049 0.0127096098 0.0122387035 0.0117840764
## [126] 0.0113452304 0.0109216786 0.0105129460 0.0101185686 0.0097380941
## [131] 0.0093710813 0.0090171003 0.0086757320 0.0083465686 0.0080292130
## [136] 0.0077232788 0.0074283900 0.0071441812 0.0068702971 0.0066063923
## [141] 0.0063521317 0.0061071893 0.0058712491 0.0056440041 0.0054251566
## [146] 0.0052144177 0.0050115074 0.0048161541 0.0046280945 0.0044470737
## [151] 0.0042728445 0.0041051676 0.0039438113 0.0037885513 0.0036391703
## [156] 0.0034954583 0.0033572119 0.0032242344 0.0030963357 0.0029733317
## [161] 0.0028550448 0.0027413030 0.0026319403 0.0025267961 0.0024257153
## [166] 0.0023285483 0.0022351504 0.0021453818 0.0020591078 0.0019761982
## [171] 0.0018965273 0.0018199739 0.0017464210 0.0016757557 0.0016078691
## [176] 0.0015426563 0.0014800159 0.0014198503 0.0013620653 0.0013065702
## [181] 0.0012532775 0.0012021028 0.0011529650 0.0011057856 0.0010604894
## [186] 0.0010170035 0.0009752581 0.0009351856 0.0008967212 0.0008598024
## [191] 0.0008243690 0.0007903629 0.0007577285 0.0007264120 0.0006963618
## [196] 0.0006675281 0.0006398630 0.0006133205 0.0005878564 0.0005634279
## [201] 0.0005399941
```

```
plot(x,y,pch = 20, col="blue4")
curve(dchisq(x,5), 0, 20, lwd = 2, col="red", add = TRUE)
```




```
# (ii) Cumulative distribution function of Chi-square distribution at

# (a): cdf F(3), with df=4
```

```r
pchisq(3,4)
```

```
## [1] 0.4421746
```

```r
# (b): cdf F(0) with df=6
pchisq(0,6)
```

```
## [1] 0
```

```r
# (c): F(X>3), with df=4
pchisq(3,4,lower.tail = F)
```

```
## [1] 0.5578254
```

```r
# (iii) Inverse cumulative distribution function of Chi-square distribution at

# (a): F^-1 (0), with df=3
qchisq(0, 3)
```

```
## [1] 0
```

```r
# (b): F^-1 (0.6), with df=5
qchisq(0.6, 5)
```

```
## [1] 5.131867
```

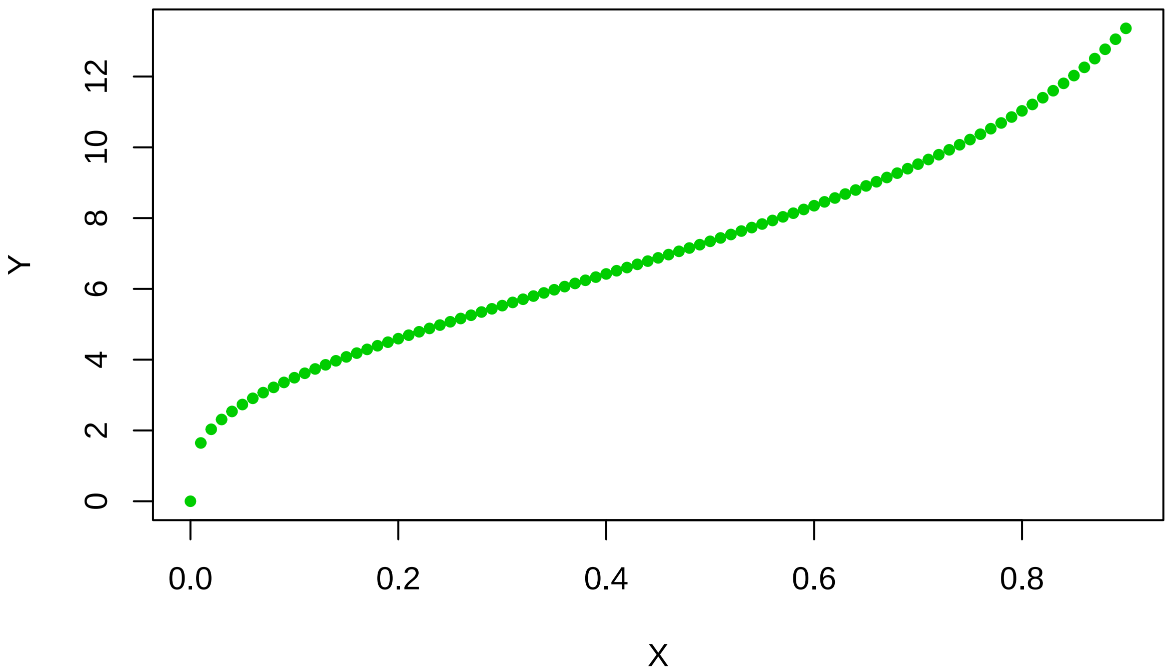
```r
# (c): To Generate a sequence x<- seq(0,.9 by=.01) and also y<- qchisq(x) with df=8, then plot (x,y).
X = seq(0, 0.9, by = 0.01)
Y = qchisq(X, 8)
X
```

```
##  [1] 0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13 0.14
## [16] 0.15 0.16 0.17 0.18 0.19 0.20 0.21 0.22 0.23 0.24 0.25 0.26 0.27 0.28 0.29
## [31] 0.30 0.31 0.32 0.33 0.34 0.35 0.36 0.37 0.38 0.39 0.40 0.41 0.42 0.43 0.44
## [46] 0.45 0.46 0.47 0.48 0.49 0.50 0.51 0.52 0.53 0.54 0.55 0.56 0.57 0.58 0.59
## [61] 0.60 0.61 0.62 0.63 0.64 0.65 0.66 0.67 0.68 0.69 0.70 0.71 0.72 0.73 0.74
## [76] 0.75 0.76 0.77 0.78 0.79 0.80 0.81 0.82 0.83 0.84 0.85 0.86 0.87 0.88 0.89
## [91] 0.90
```

```r
Y
```

```
##  [1]  0.000000  1.646497  2.032477  2.310075  2.536649  2.732637  2.907960
##  [8]  3.068276  3.217153  3.357002  3.489539  3.616035  3.737460  3.854575
## [15]  3.967989  4.078199  4.185617  4.290589  4.393410  4.494331  4.593574
## [22]  4.691330  4.787770  4.883047  4.977296  5.070640  5.163193  5.255056
## [29]  5.346324  5.437085  5.527422  5.617411  5.707125  5.796632  5.886000
## [36]  5.975289  6.064562  6.153877  6.243292  6.332863  6.422646  6.512694
## [43]  6.603062  6.693805  6.784976  6.876631  6.968824  7.061612  7.155052
## [50]  7.249202  7.344121  7.439873  7.536520  7.634128  7.732768  7.832509
## [57]  7.933428  8.035604  8.139119  8.244062  8.350525  8.458609  8.568417
## [64]  8.680063  8.793667  8.909359  9.027279  9.147577  9.270418  9.395980
## [71]  9.524458  9.656065  9.791035  9.929627 10.072127 10.218855 10.370167
## [78] 10.526462 10.688194 10.855875 11.030091 11.211517 11.400931 11.599246
## [85] 11.807535 12.027074 12.259399 12.506380 12.770329 13.054150 13.361566
```

```r
plot(X,Y,pch=20, col="green3")
```




```
# (iv) Generate a random sample of 10 observations from a Chi-square distribution with df=10.
rchisq(10, 10)
```

```
##  [1] 11.047521 17.250368  9.845206  4.448124  9.979346  5.592783 13.022552
##  [8] 13.874561  7.116385 11.213418
```