(5 points): Contingency Table

Using the STAT130-survey.csv dataset, construct a contingency table of Sex x Handed. (4 pts)

Are the proportions of right-handed students similar for Males and Females? (1 pt)

```
> stat130<-read.csv('STAT130-survey.csv')

> head(stat130)

  ID Sex Height Weight  EyeColor Handed Age

1  1   M   70.0    150     Hazel  Right  18

2  2   M   71.0    230     Brown  Right  20

3  3   F   62.5    172      Blue  Right  37

4  4   F   62.0    135 DarkBrown  Right  31

5  5   M   66.0    165     Brown  Right  21

6  6   M   68.0    185 DarkBrown  Right  29

> table(stat130$Sex, stat130$Handed)


    Ambi Left Right

  F    6   22   117

  M    1    3    46

> table.margins(table(stat130$Sex, stat130$Handed))


        Ambi Left Right Total

  F       6   22   117   145

  M       1    3    46    50

  Total    7   25   163   195

> c(46/50, 117/145)

[1] 0.9200000 0.8068966
```

(10 points): Statistics and Normal Q-Q Plots For the ‘pottery’ data of Table 1.3 in the text:

Find the covariance and correlation matrices for the numeric variables. (4 pts)

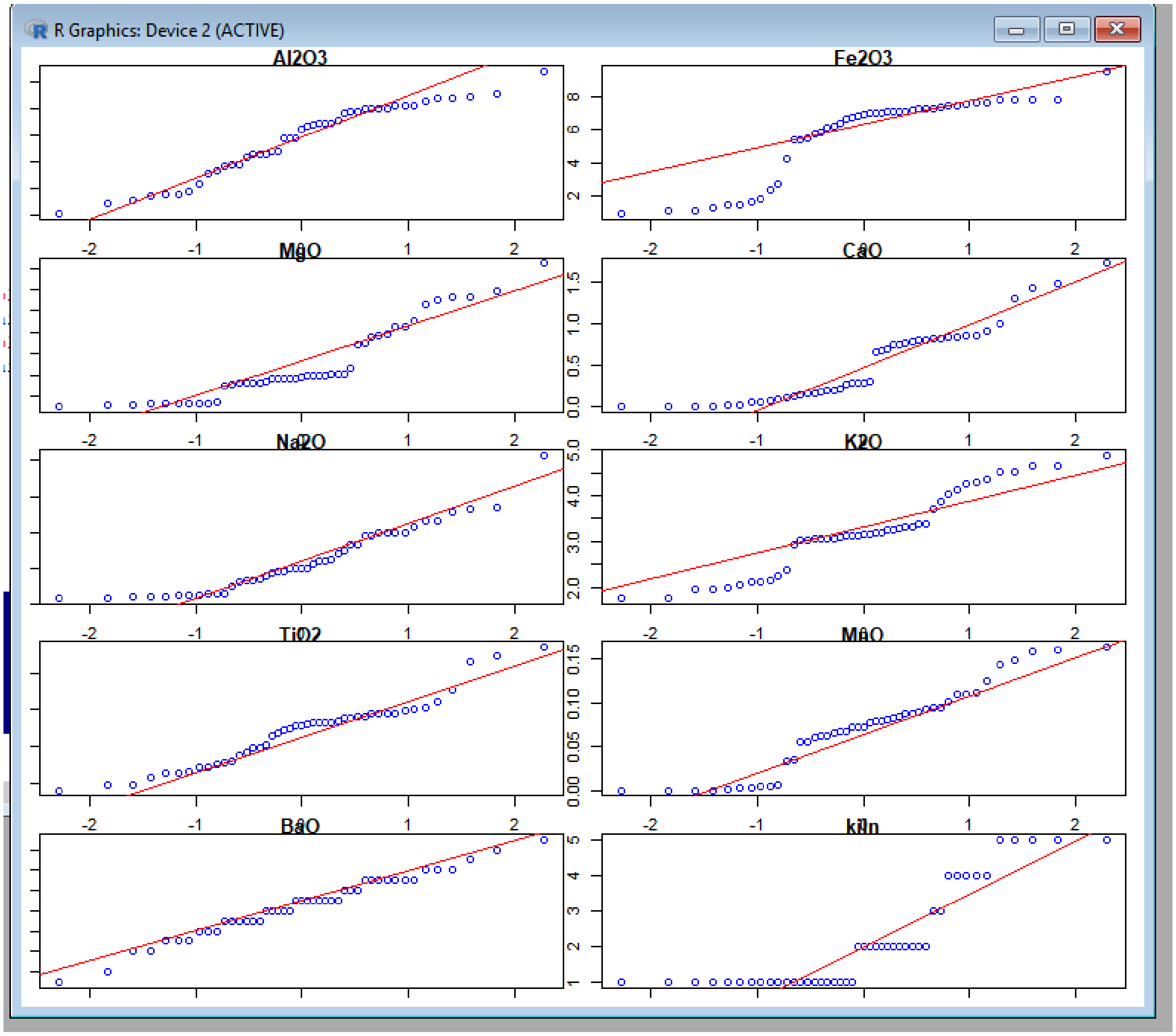
Generate the normal Q-Q plots for the numeric variables. (5 pts)

Is there anything unusual about the data? (1 pt)

```
> pottery<-read.csv('pottery.csv')
> head(pottery)
  X Al2O3 Fe2O3  MgO  CaO Na2O  K2O TiO2   MnO   BaO kiln
1 1  18.8  9.52 2.00 0.79 0.40 3.20 1.01 0.077 0.015    1
2 2  16.9  7.33 1.65 0.84 0.40 3.05 0.99 0.067 0.018    1
3 3  18.2  7.64 1.82 0.77 0.40 3.07 0.98 0.087 0.014    1
4 4  16.9  7.29 1.56 0.76 0.40 3.05 1.00 0.063 0.019    1
5 5  17.8  7.24 1.83 0.92 0.43 3.12 0.93 0.061 0.019    1
6 6  18.8  7.45 2.06 0.87 0.25 3.26 0.98 0.072 0.017    1
> numvars<-pottery[,-1]
> cov(numvars)
             Al2O3        Fe2O3           MgO          CaO         Na2O
Al2O3  7.306282828 -0.907852020 -3.4490767677  0.2845131313  0.007860101
Fe2O3 -0.907852020  5.787928586  1.6480894444  0.7242160101  0.288911162
MgO   -3.449076768  1.648089444  3.0349497980 -0.1470693434  0.046438687
CaO    0.284513131  0.724216010 -0.1470693434  0.2063688889  0.041789495
Na2O   0.007860101  0.288911162  0.0464386869  0.0417894949  0.031771010
K2O   -1.408931818  1.263231818  1.2985022727  0.0217977273  0.049190909
TiO2   0.341734848 -0.063087879 -0.2151439394  0.0134666667  0.001359848
MnO   -0.071716010  0.075447202  0.0638964949  0.0030065505  0.004451444
BaO    0.002533990  0.001515611 -0.0003453232  0.0003376869  0.000194399
```

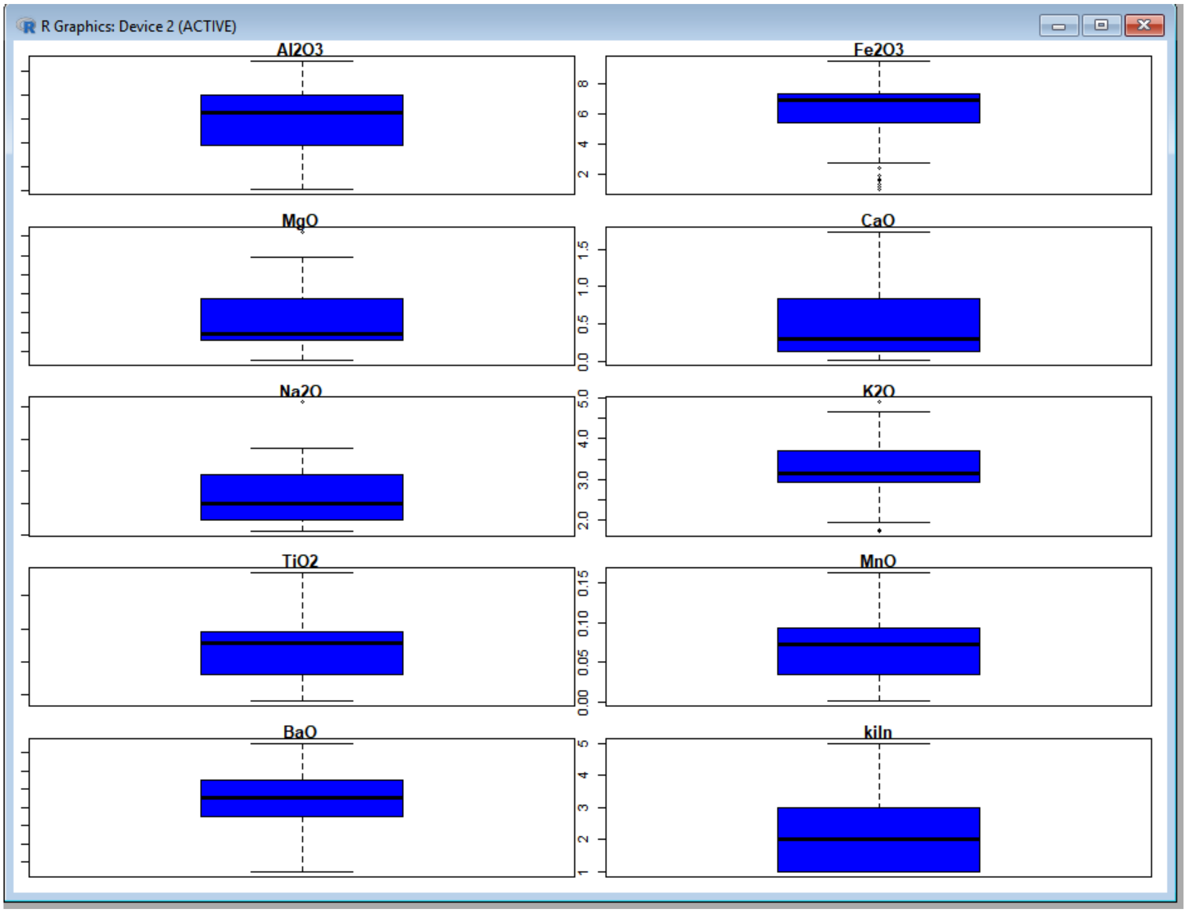
```
kiln   0.351060606 -3.179712121 -0.6836515152 -0.4811666667 -0.167212121
            K2O        TiO2          MnO          BaO         kiln
Al2O3 -1.40893182  0.3417348485 -7.171601e-02  2.533990e-03  0.3510606061
Fe2O3  1.26323182 -0.0630878788  7.544720e-02  1.515611e-03 -3.1797121212
MgO    1.29850227 -0.2151439394  6.389649e-02 -3.453232e-04 -0.6836515152
CaO    0.02179773  0.0134666667  3.006551e-03  3.376869e-04 -0.4811666667
Na2O   0.04919091  0.0013598485  4.451444e-03  1.943990e-04 -0.1672121212
K2O    0.72714091 -0.0926318182  3.394068e-02  1.775000e-04 -0.5672727273
TiO2  -0.09263182  0.0323318182 -4.573712e-03  1.269697e-04  0.0356818182
MnO    0.03394068 -0.0045737121  2.190346e-03  2.511919e-05 -0.0372060606
BaO    0.00017750  0.0001269697  2.511919e-05  8.891919e-06 -0.0007515152
kiln  -0.56727273  0.0356818182 -3.720606e-02 -7.515152e-04  1.9818181818
> cor(numvars)
           Al2O3      Fe2O3        MgO        CaO       Na2O        K2O
Al2O3  1.00000000 -0.1396064 -0.73245149  0.23170316  0.01631415 -0.61126911
Fe2O3 -0.13960637  1.0000000  0.39322710  0.66265034  0.67373208  0.61576101
MgO   -0.73245149  0.3932271  1.00000000 -0.18583362  0.14955077  0.87409305
CaO    0.23170316  0.6626503 -0.18583362  1.00000000  0.51609482  0.05627038
Na2O   0.01631415  0.6737321  0.14955077  0.51609482  1.00000000  0.32363840
K2O   -0.61126911  0.6157610  0.87409305  0.05627038  0.32363840  1.00000000
TiO2   0.70311435 -0.1458375 -0.68681267  0.16486290  0.04242872 -0.60413756
MnO   -0.56690655  0.6700777  0.78369102  0.14141321  0.53361624  0.85046191
BaO    0.31438288  0.2112654 -0.06647407  0.24928394  0.36574697  0.06980577
kiln   0.09225756 -0.9388459 -0.27875786 -0.75238740 -0.66637752 -0.47255320
            TiO2        MnO        BaO       kiln
```

```
Al2O3  0.70311435 -0.5669065  0.31438288  0.09225756

Fe2O3 -0.14583752  0.6700777  0.21126543 -0.93884590

MgO   -0.68681267  0.7836910 -0.06647407 -0.27875786

CaO    0.16486290  0.1414132  0.24928394 -0.75238740

Na2O   0.04242872  0.5336162  0.36574697 -0.66637752

K2O   -0.60413756  0.8504619  0.06980577 -0.47255320

TiO2   1.00000000 -0.5434973  0.23680304  0.14096134

MnO   -0.54349725  1.0000000  0.17999130 -0.56470987

BaO    0.23680304  0.1799913  1.00000000 -0.17902269

kiln   0.14096134 -0.5647099 -0.17902269  1.00000000

> par(mfrow=c(5,2))

> par(mar=c(1,1,1,1))

> for(i in 2:ncol(pottery)){

+ qqnorm(pottery[,i], main=colnames(pottery)[i], col='blue')

+ qqline(pottery[,i], col='red')

+ }
```



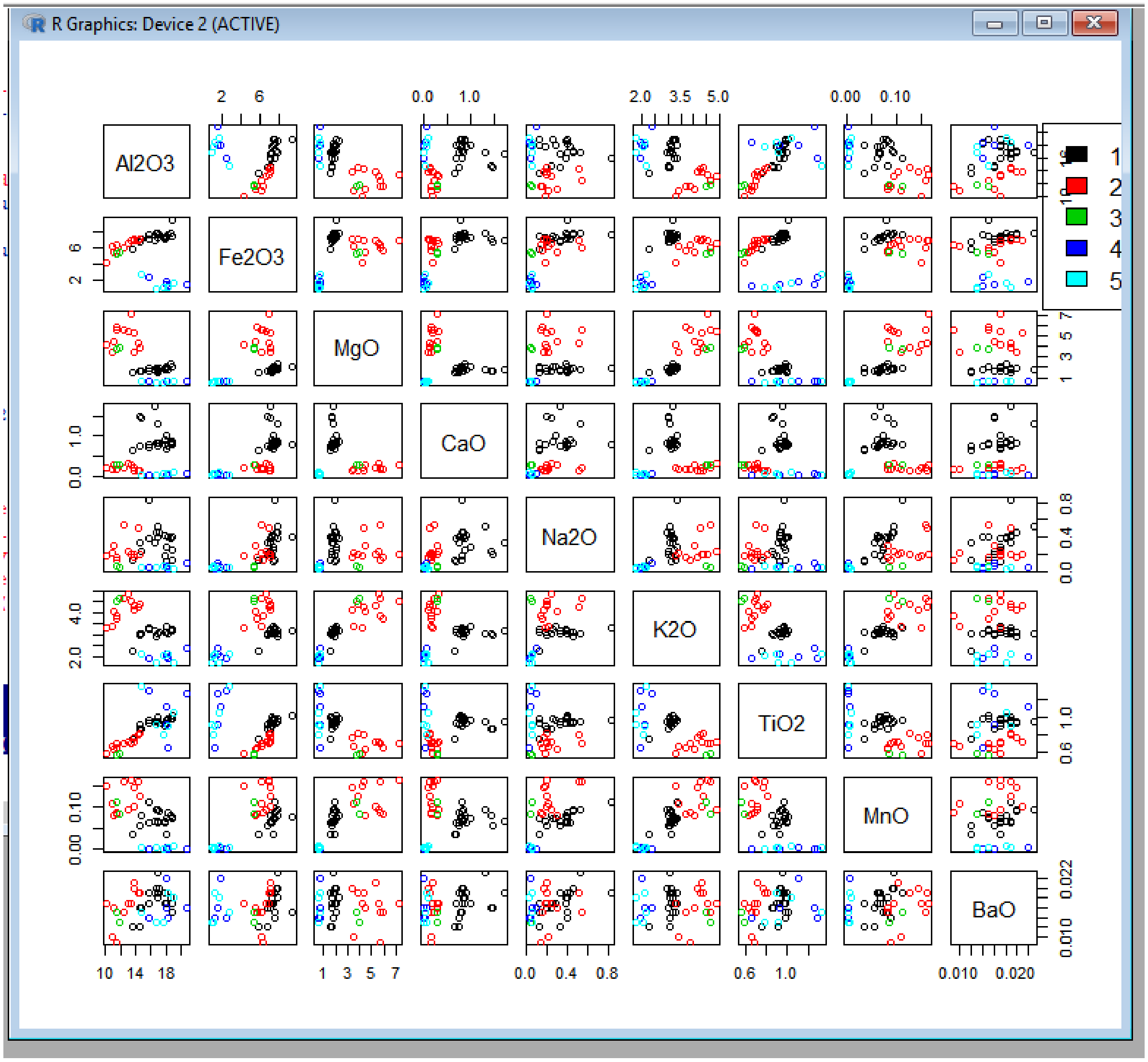
(5 points): Boxplots For the 'pottery' data of Table 1.3 in the text (also posted in the course on Lesson 1 page), generate boxplots for each numeric variable.

```
> par(mfrow=c(5,2))

> par(mar=c(1,1,1,1))

> for(i in 2:ncol(pottery)){

+ boxplot(pottery[,i], main=colnames(pottery)[i], col='blue')

+ }
```



(10 points): Scatterplot Matrix For the ‘pottery’ data of Table 1.3 in the text, generate a scatterplot matrix of the numeric variables. If possible, identify each point by its kiln number in some way. (HINT: consider ‘pairs(pottery[,2:10], col=pottery$kiln)’.)

```
> pairs(pottery[,2:10], col=pottery$kiln)

> par(xpd = TRUE)

> legend(1.02,1.02, fill = unique(pottery$kiln), legend = c( levels(as.factor(pottery$kiln))))

>
```


R Graphics: Device 2 (ACTIVE)
Al2O3
Fe2O3
MgO
CaO
Na2O
K2O
TiO2
MnO
BaO
1
2
3
4
5
2 6
0.0 1.0
2.0 3.5 5.0
0.00 0.10
10 14 18
1 3 5 7
0.0 0.4 0.8
0.6 1.0
0.010 0.020