Lab 8

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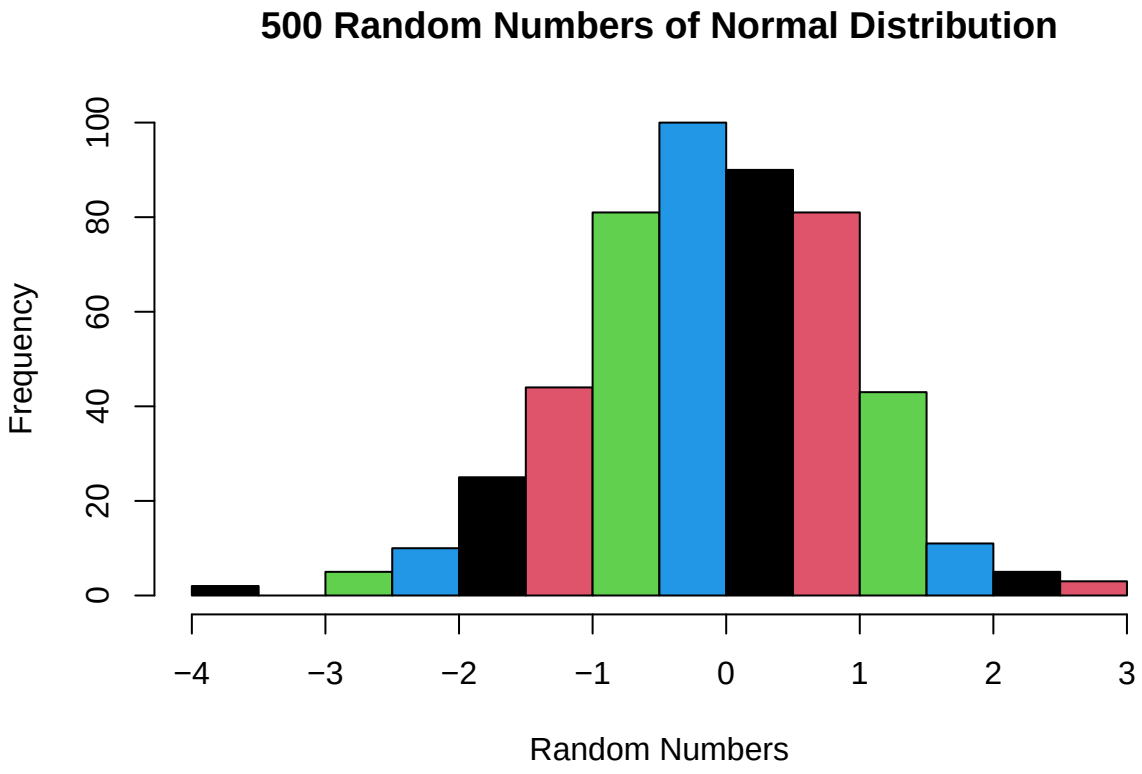
1) Generate 500 random numbers from a standard normal distribution and display them using a histogram.

```
q1 = rnorm(500)
hist(q1,
     main='500 Random Numbers of Normal Distribution',
     xlab='Random Numbers',
     col=c(1,2,3,4))
```



2) The National Highway System designation Act

```
speed = read.table('C:/repos/STAT 50001/Lab 8/speed.txt',
                   header=TRUE, sep='\t')
x = factor(speed$INCREASe, c("Yes", "No"))
boxplot(speed$FATALITIESCHANGE ~ x,
        col=c("red", "green"),
        main="Speed limit and Traffic Fatalities",
        xlab="Increase", ylab="Fatalities Change")
```

3) All registered elevators in New York City are provided in the link below

```
# https://www.kaggle.com/new-york-city/nyc-elevators/discussion/39528
```

a) Import the data in R.

```
nyc = read.csv('C:/repos/STAT 50001/Lab 8/NYC.csv', header=TRUE)
```

b) How many elevators are active?

```
nrow(nyc[nyc$Device.Status == "A",])
```

```
## [1] 66885
```

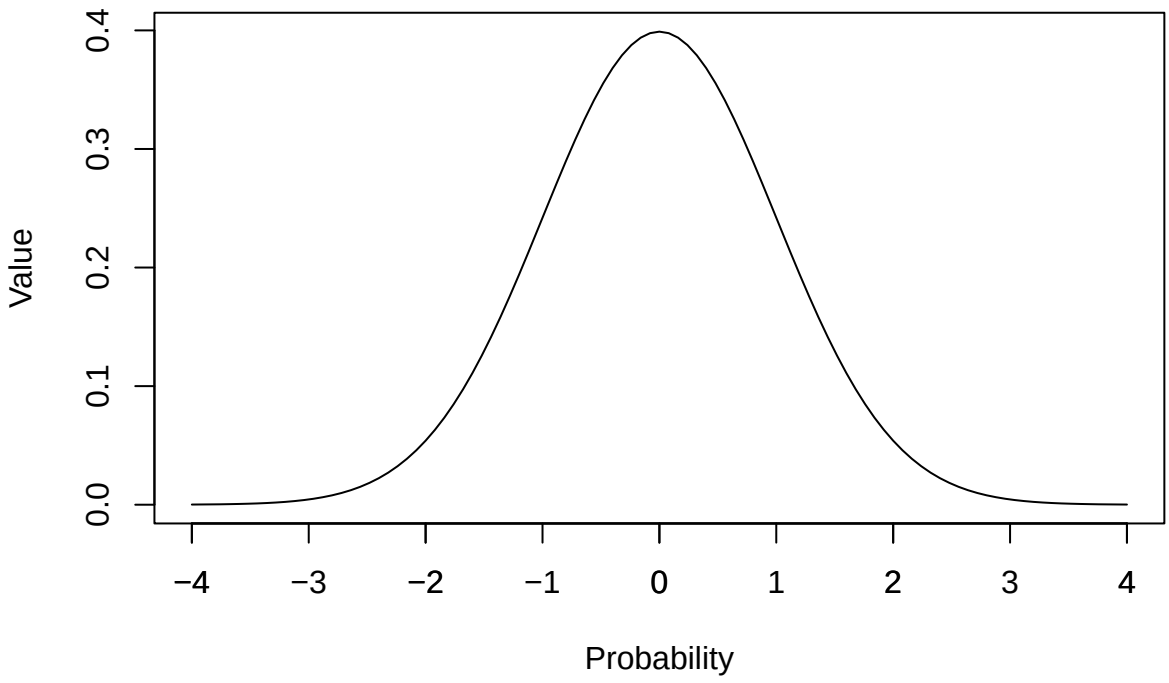
c) How many elavators are active in Manhattan borough?

```
s = subset(nyc, Borough=="Manhattan")
nrow(s[s$Device.Status == "A",])
```

```
## [1] 39379
```

4) Plot pdf of a standard normal distribution by generating data in (-4.4)

```
curve(dnorm, -4, 4, xlab= "Probability", ylab="Value")
axis(1, at=-4:4, labels=c(-4,-3,-2,-1,0,1,2,3,4))
```



5) Generate 100 random numbers from a normal dist with mean=5 and var=64

```
rnorm(100, mean=5, sd=sqrt(64))
```

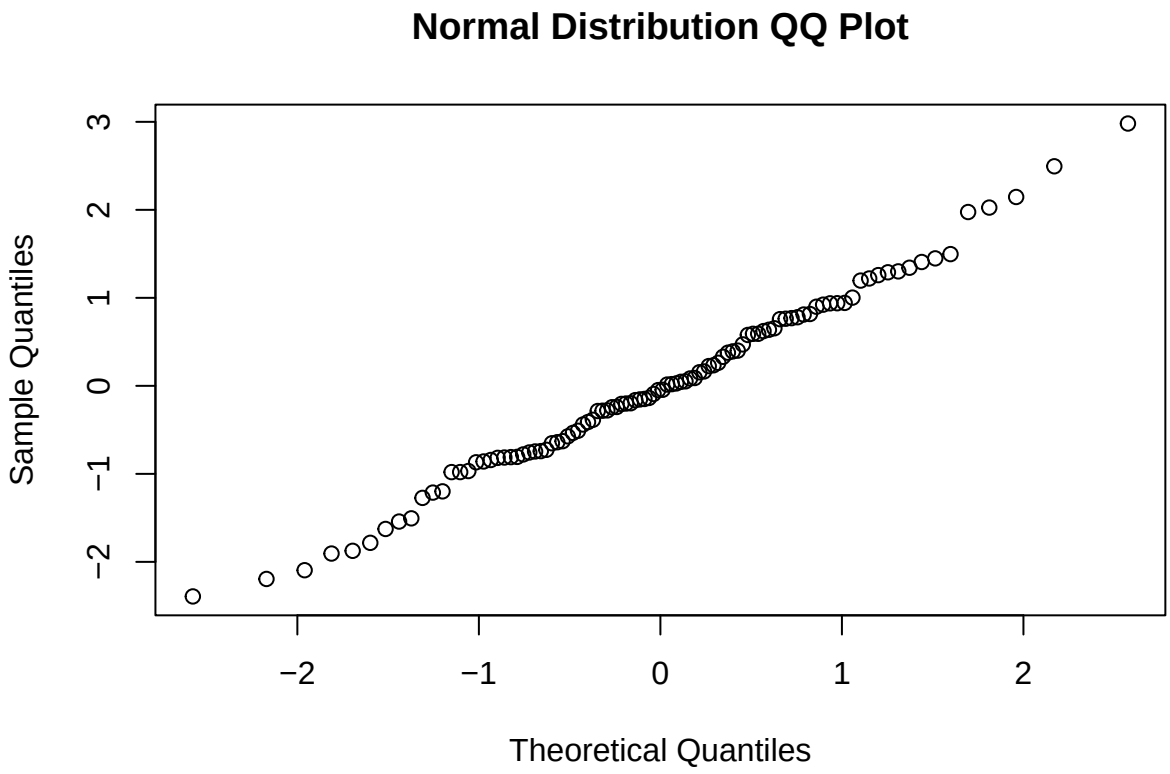
```
##   [1]   1.8462583  -8.5940100  16.7430797  22.5669981   7.8226274  -6.2916258
##   [7]  -5.5673355  -0.1595954  -1.2076404   7.1480715   5.3380908   0.1797402
##  [13]   7.2951492  -1.8589688   6.3984054   4.8444478  -7.4756381   4.4798499
```

```
##  [19]   3.1579872 -12.3885144  -1.3674717  -5.9377475   0.4382590   2.6808131
##  [25]  -5.4835301   9.4266040  10.9654043   3.5811906  18.1743577  -7.1477724
##  [31]   7.3971669  -4.0982745   5.7572412  10.1339615  -2.4343606  -1.0184899
##  [37]   8.7087954   4.0442221   6.2730038  -4.0817552  15.2888993  -3.3093307
##  [43]  17.4501787  -2.3387456  -1.6429966   3.5929798  14.3774067  24.0560144
##  [49]  23.1374893  13.1126718  -1.3733029  -1.2574509  -2.5505947  -4.3393157
##  [55] -14.2589159   2.3862451  14.2887495   2.4929030  10.4379211  -6.5248547
##  [61]  21.9372168   8.9188540   4.2164748  17.9859778   8.3079639   1.0396185
##  [67]   3.3616420  -2.1327580   1.0174223   7.4229545  -3.0946968   6.3566964
##  [73]   4.9755764   3.4963434  -1.1701848   9.6676718   7.0198572  -9.3883710
##  [79]  -0.1034717  15.3251436   8.0431584   4.3713371   1.7575473  11.6919869
##  [85]   5.8620304  13.7758280  16.9758719   9.9431210  13.4569431  -3.1550692
##  [91]  29.4173605  17.0438041   3.5385145   9.6894557  -1.8268672  10.8248101
##  [97]   4.1635843   7.1238156   3.8904762   4.7895814
```

6) Generate 100 random sample from each of the following distributino and draw their normal qq plots

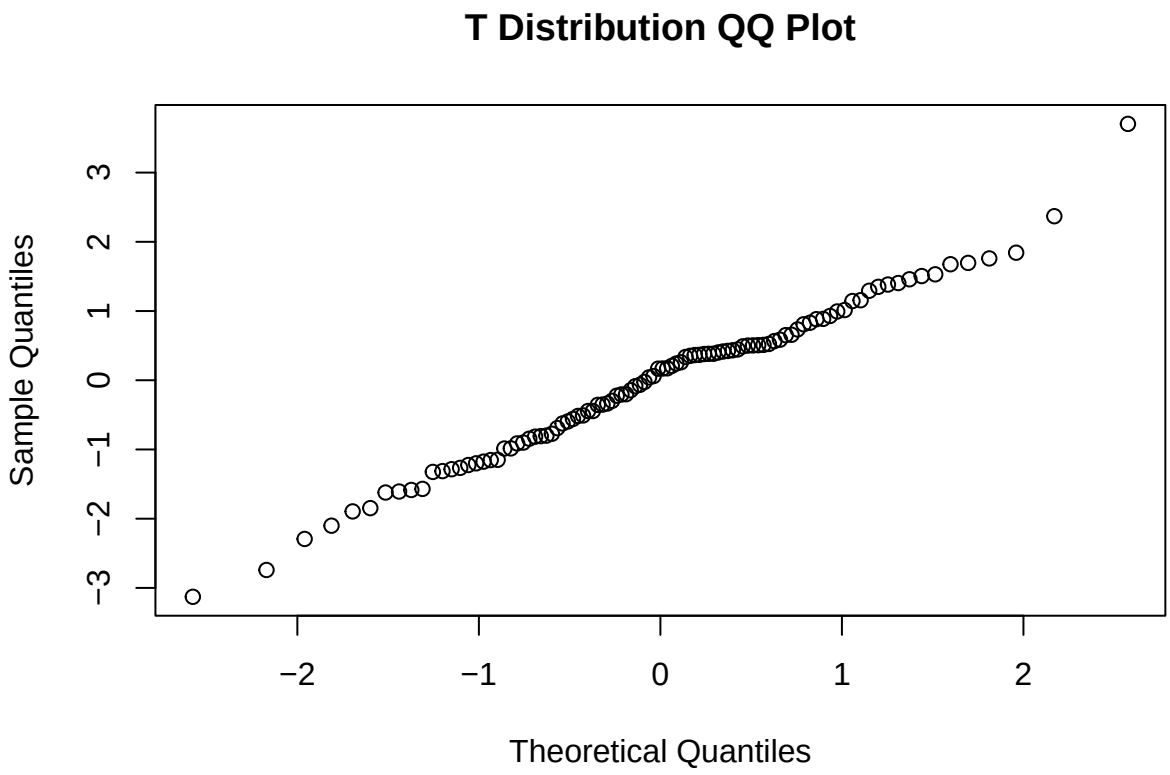
a) Normal

```
qqnorm(rnorm(100), main="Normal Distribution QQ Plot")
```



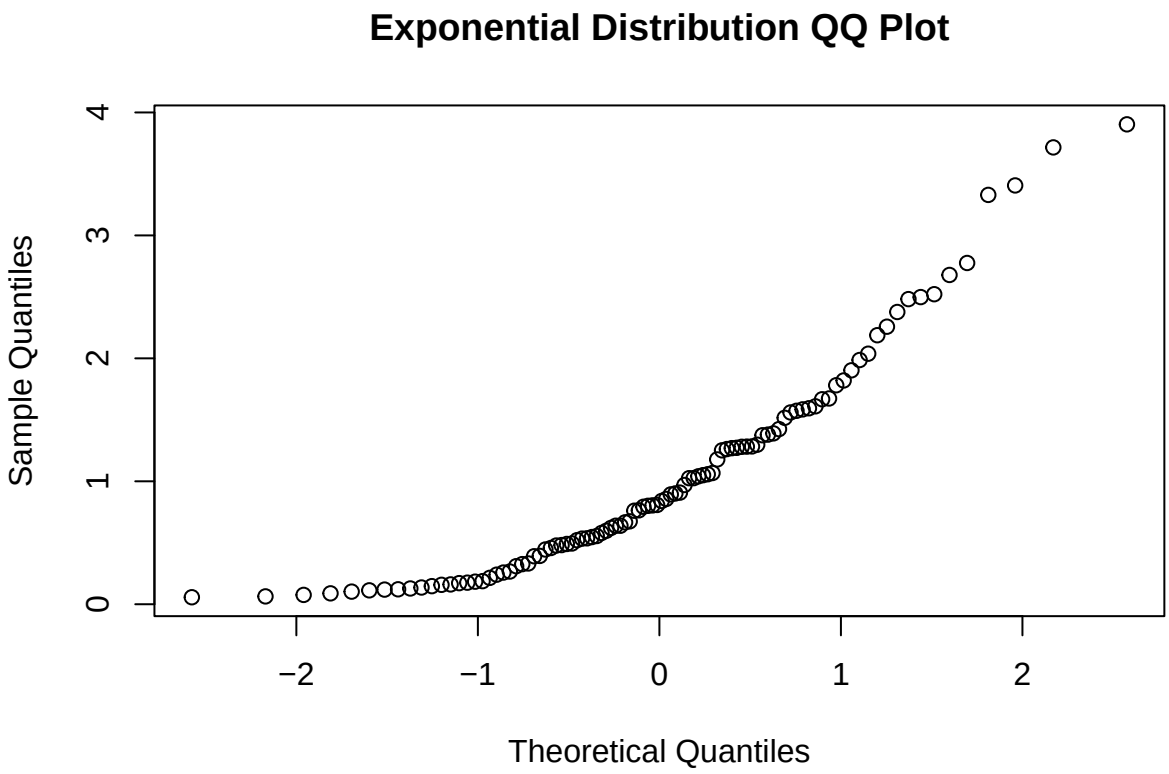
b) Student's t (df=20)

```
qqnorm(rt(100, 20), main="T Distribution QQ Plot")
```



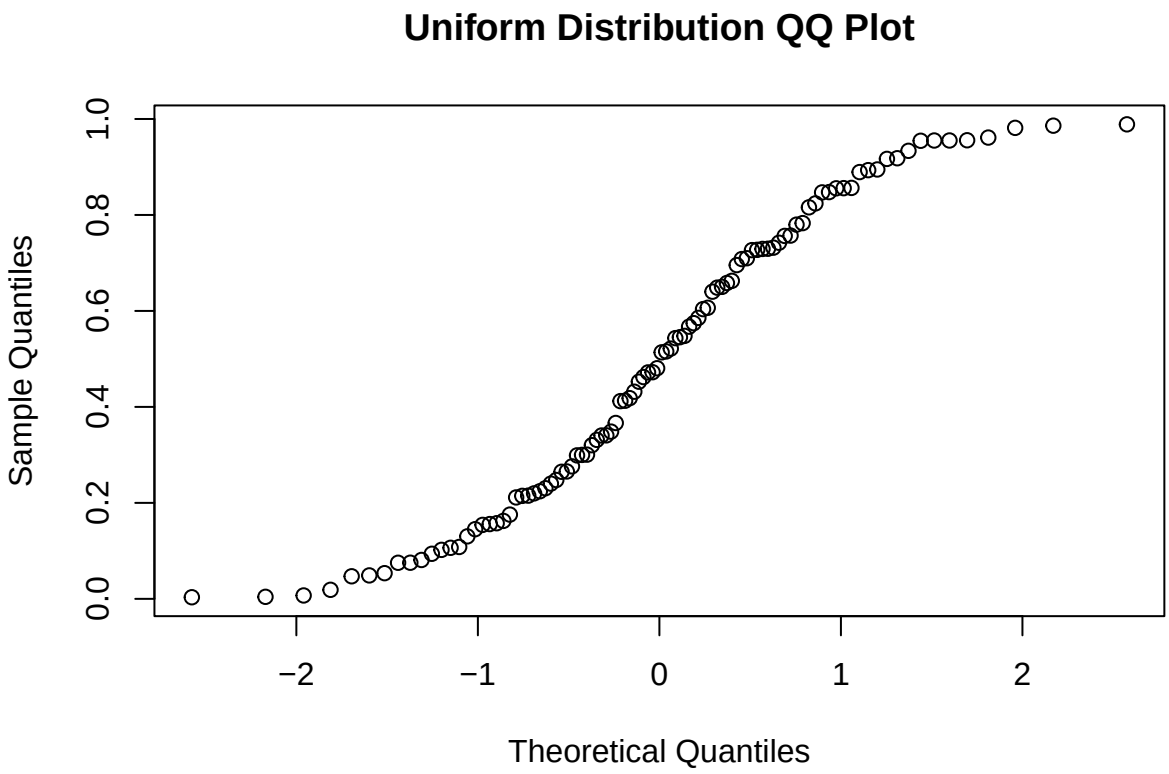
c) Exponential (rate=1)

```
qqnorm(rexp(100), main="Exponential Distribution QQ Plot")
```



d) Uniform

```
qqnorm(runif(100), main="Uniform Distribution QQ Plot")
```


Uniform Distribution QQ Plot
Sample Quantiles
0.0
0.2
0.4
0.6
0.8
1.0
−2
−1
0
1
2
Theoretical Quantiles