In $R$ numbers can used in vectors and in matrices. We begin by creating a vector and then doing some elementary operations on it.

```
> w<-c(1,2,4)
> w[3]<-3
> w

[1] 1 2 3

> w1<-c(w,4)+4
> w1

[1] 5 6 7 8

> w2<-1:4
> w1*w2

[1]  5 12 21 32
```

Next we generate a random sample of size 50 from a normal distribution with mean 100 and standard deviation 7 and apply some of $R$'s built in functions to the result.

```
> x<-rnorm(50,100,7)
> x[c(1,3)]

[1]  94.62999 101.39920

> mean(x)

[1] 99.25023

> var(x)

[1] 62.40661

> min(x)

[1] 82.3573

> median(x)

[1] 98.77586

> quantile(x)

       0%       25%       50%       75%      100%
 82.35730  94.87472  98.77586 105.88346 111.89912

> as.numeric(quantile(x,c(0.25,0.6)))
```

```
[1] 94.87472 99.44699
```

In the above hist(x) would make a histogram of the values in $x$.

In the next bit of code we generate observations from 5 independent binomial distributions and play around with matrix notation.

```
> N<-c(10,20,30,40,50)
> p<-seq(0.1,0.9,length=5)
> y<-rbinom(5,N,p)
> M1<-rbind(N,y)
> dim(M1)

[1] 2 5

> M1[2,]

[1]  1  6 13 30 46

> M1[2,5]

 y
46

> apply(M1,1,mean)

   N    y
30.0 19.2
```

Suppose 5 subjects in an experiment received the treatment and 4 belonged to the control group. In the following $x$ identifies which group the subject belonged to and $y$ is the measurement of interest.

```
> x<-c(1,1,2,1,2,2,1,2,2)
> y<-c(11,9,15,14,11,14,12,15,16)
> y[x==1]

[1] 11  9 14 12

> dum<-split(y,x)  #this creates a list
> length(dum)

[1] 2

> dum[[1]]

[1] 11  9 14 12

> dum[[1]][2]

[1] 9

> sapply(dum,mean)

   1    2
11.5 14.2
```