1. Calculate the following numerical results to the three decimal places
   1. > a = (7+8)+5^3-5/6+sqrt(62)

> round(a,3)

[1] 147.041

* 1. > b = log(3) + sqrt(2)\*sin(pi)-exp(3)

> round(b,3)

[1] -18.987

* 1. > c = 2\*(5+3)-sqrt(6)+9^2

> round(c,3)

[1] 94.551

* 1. > d = log(5)-exp(2)+2^3

> round(d,3)

[1] 2.22

* 1. > e = (9/2)\*4-sqrt(10)+log(6)-exp(1)

> round(e,3)

[1] 13.911

* 1. > f = log10(14)+log(14)+(47 %% 5)

> round(f,3)

[1] 5.785

1. Create the following vectors
   1. The vector consisting of the decreasing sequence of consecutive integers from 50 to -5.  
      a = seq(50,-5,by=-1)
   2. The vector of first 100 positive integers, without the perfect squares.

b<-seq(1,100)

t<-b^2

b<-b[-t]

* 1. The vector of the factorial values of 0 to 10.

> for (i in 1:11)

c[i] = factorial(i-1)

* 1. V1= 1 1 1 1 2 2 2 2 3 3 3 3 4 4 4 4 5 5 5 5

> V1 = rep(c(1,2,3,4,5),each=4)

* 1. V2= MATH, MATH, STAT, STAT, STAT, STAT, STAT, ECE,ECE,ECE, BIO,BIO

V2 = noquote(rep(c("MATH","STAT","ECE","BIO"),c(2,5,3,2)))

1. Create the following matrix (M) with the column and row names (Note that the numbers are in sequence from 1 to 20)

> M = matrix(seq(1,20),nrow=4,byrow=T,dimnames=list(rows=c("Experiment.1","Experiment.2","Experiment.3","Experiment.4"),cols=c("column-1","column-2","column-3","column-4","column-5")))

> M

cols

rows column-1 column-2 column-3 column-4 column-5

Experiment.1 1 2 3 4 5

Experiment.2 6 7 8 9 10

Experiment.3 11 12 13 14 15

Experiment.4 16 17 18 19 20

* 1. Determine the dimension of the matrix M

> dim(M)

[1] 4 5

* 1. Select the first two row of the matrix M

> head(M,2)

cols

rows column-1 column-2 column-3 column-4 column-5

Experiment.1 1 2 3 4 5

Experiment.2 6 7 8 9 10

* 1. Calculate the sum of all columns of the matrix M

> colSums(M)

column-1 column-2 column-3 column-4 column-5

34 38 42 46 50

* 1. Calculate the sum of all rows of the matrix M

> rowSums(M)

Experiment.1 Experiment.2 Experiment.3 Experiment.4

15 40 65 90

* 1. Use “sample" to shuffle the elements of each row of the matrix M

> M[sample.int(dim(M)[1]),]

cols

rows column-1 column-2 column-3 column-4 column-5

Experiment.4 16 17 18 19 20

Experiment.1 1 2 3 4 5

Experiment.2 6 7 8 9 10

Experiment.3 11 12 13 14 15

1. Test scores of Fifteen students in Test 1 and Test 2 are presented below
   1. How many students have their test 1 score greater than 80?

> col1 = seq(1,15)

> col2 = c(56,78,87,89,95,98,NA,78,87,98,54,89,78,98,97)

> col3 = c(86,67,78,89,87,67,94,78,81,83,78,NA,93,98,100)

> data = data.frame(col1,col2,col3)

> length(which(data[,2]>80))

[1] 9

* 1. How many students have their test 2 score greater than 85 ?

> length(which(data[,3]>85))

[1] 7

* 1. Did all fifteen students take both tests?

> any(is.na(data[,2])==T) && any(is.na(data[,3])==T)

[1] TRUE

* 1. How many students did better in the second test than the first test?  
     > length(which((data[,3]-data[,2])>0))

[1] 4

* 1. How many students have the same score in the first and second test?

> length(which((data[,3]-data[,2])==0))

[1] 3

1. Use R to solve the following system of equations:

> data = c(1,2,-1,3,-1,1,-3,1,2,-1,2,1,1,-3,1,1,-1,2,1,-1,2,1,-1,2,1)

> A = matrix(data,nrow=5,byrow=T)

> Y = matrix(c(0,-9,12,1,-2))

> X = solve(A,Y)

> X

[,1]

[1,] 1

[2,] 3

[3,] 2

[4,] -2

[5,] -1

1. Fibonacci sequence

> Fibonacci <- numeric(50)

> Fibonacci[1] <- Fibonacci[2] <- 1

> for (i in 3:50) Fibonacci[i] <- Fibonacci[i - 2] + Fibonacci[i - 1]

> Fibonacci

[1] 1 1 2 3 5 8 13 21

[9] 34 55 89 144 233 377 610 987

[17] 1597 2584 4181 6765 10946 17711 28657 46368

[25] 75025 121393 196418 317811 514229 832040 1346269 2178309

[33] 3524578 5702887 9227465 14930352 24157817 39088169 63245986 102334155

[41] 165580141 267914296 433494437 701408733 1134903170 1836311903 2971215073 4807526976

[49] 7778742049 12586269025

1. Create the following data frame

> Age = c(26,31,23,52,76,39,26)

> Height = c(175,165,190,179,163,183,164)

> Weight = c(157,139,163,155,170,183,153)

> Sex = c("F","M","F","M","M","F","M")

> Name = c("Joe","Nina","Mark","Sonia","Martha","Andrew","Marcie")

> data = data.frame(row.names = Name,Age,Height,Weight,Sex)

* 1. It appears that the categorical variable Sex has been recorded incorrectly. Invert Sex for all individuals.

for(i in 1:7){

if(data[i,4]=='F'){

data[i,4]='M'

}else{

data[i,4]='F'

}

}

* 1. Sort the data in increasing order of Age.

> newdata=data[order(data[,"Age"]),]

> newdata

Age Height Weight Sex

Mark 23 190 163 M

Joe 26 175 157 M

Marcie 26 164 153 F

Nina 31 165 139 F

Andrew 39 183 183 M

Sonia 52 179 155 F

Martha 76 163 170 F

* 1. Sort the data in descending order of Age.

> newdata=data[rev(order(data[,"Age"])),]

> newdata

Age Height Weight Sex

Martha 76 163 170 F

Sonia 52 179 155 F

Andrew 39 183 183 M

Nina 31 165 139 F

Marcie 26 164 153 F

Joe 26 175 157 M

Mark 23 190 163 M