STAT 2450 Assignment 3

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In the following exercises, use “for” loops to do your iteration.  
(Do NOT use the built in function “sum”).

1. Use a “for” loop to evaluate the following sum, when x=.5.

y=0  
x=.5  
for(i in 0:10){  
 y = y + x^i  
}  
print(y)

## [1] 1.999023

Your answer should be 1.999023.

1. Use a for loop, and the built in function “sqrt”, to do the following:

* loop over the elements of x=c(16,-9,9,4,-1,0)
* if the element x[i] is positive, print x[i] and the square root of x[i] or else if x[i] is negative, print(“x[i] is negative”)

x=c(16,-9,9,4,-1,0)  
for(i in x){  
 if(i>=0){ print(c(i,sqrt(i)))  
 } else{  
 print("x[i] is negative")  
 }  
}

## [1] 16 4  
## [1] "x[i] is negative"  
## [1] 9 3  
## [1] 4 2  
## [1] "x[i] is negative"  
## [1] 0 0

Your output should be equivalent to:

16 4

“x[i] is negative”

9 3

4 2

“x[i] is negative”

0 0

1. Use a “for” loop to iterate over the elements of a vector x, and increment a counter nodd when the element of x is odd. Then print the number of even and odd elements of x.

Recall that an integer y is odd if y%%2==1, and otherwise y is even.

Use the R commands below to generate a vector “x” of length 100.

set.seed(10)   
x=sample(1:10,100,replace=T)

Then modify the following code.

nodd=0  
for(i in x){  
 if(i%%2!=0){ nodd=nodd+1  
 }  
}  
neven=length(x)-nodd  
paste("number of odd elements = ",nodd)

## [1] "number of odd elements = 56"

paste("number of even elements = ",neven)

## [1] "number of even elements = 44"

For this vector x, the number of odd elements should be 56.

1. Generate a random 5x5 matrix whose entries are the numbers 1,2, … 25, but in random positions, using the following code:

set.seed(27) #set the seed for the random number generator  
x=matrix(sample(1:25), byrow=T,ncol=5)   
x

## [,1] [,2] [,3] [,4] [,5]  
## [1,] 25 3 21 8 5  
## [2,] 9 2 1 24 4  
## [3,] 10 12 7 20 15  
## [4,] 22 14 18 23 11  
## [5,] 6 16 19 13 17

Then, using a pair of nested for loops, loop over the positions in the matrix x, and if the associated element of x is odd, replace the element by its negative.

for(i in 1:nrow(x)){  
 for(j in 1:ncol(x)){  
 x[i,j]=ifelse(x[i,j]%%2==1, -x[i,j], x[i,j])  
 }  
}  
print(x)

## [,1] [,2] [,3] [,4] [,5]  
## [1,] -25 -3 -21 8 -5  
## [2,] -9 2 -1 24 4  
## [3,] 10 12 -7 20 -15  
## [4,] 22 14 18 -23 -11  
## [5,] 6 16 -19 -13 -17

Your answer should be equivalent to:

-25 -3 -21 8 -5

-9 2 -1 24 4

10 12 -7 20 -15

22 14 18 -23 -11

6 16 -19 -13 -17