All about vectors in R

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# A vector is collection of elements of same type.  
# (ie) A vector cannot be of mixed type.  
# R is a Vectorized Language. Thant means operations are applied to each element of the vector automatically,  
# .., without the need to loop through the vector.  
# This is a powerful concept and vector plays a crucial and significant role in R.  
  
# Creating Vectors  
# The most common way to create a Vector is using 'c' [combine]  
x = c(1,2,3,4,5,6,7,8,9,10)  
x

## [1] 1 2 3 4 5 6 7 8 9 10

# Vector Operations  
x\*3 # multiplies each element by 3; No loops necessary!

## [1] 3 6 9 12 15 18 21 24 27 30

x+2

## [1] 3 4 5 6 7 8 9 10 11 12

x-3

## [1] -2 -1 0 1 2 3 4 5 6 7

x/4

## [1] 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50

x^2

## [1] 1 4 9 16 25 36 49 64 81 100

sqrt(x)

## [1] 1.000000 1.414214 1.732051 2.000000 2.236068 2.449490 2.645751 2.828427  
## [9] 3.000000 3.162278

# colon (:) operation - Sequencing  
# Creates sequence of Numbers in either direction!  
1:10 #(: - Through)

## [1] 1 2 3 4 5 6 7 8 9 10

10:1

## [1] 10 9 8 7 6 5 4 3 2 1

-2:3

## [1] -2 -1 0 1 2 3

5:-7

## [1] 5 4 3 2 1 0 -1 -2 -3 -4 -5 -6 -7

# More on Vector Operations ... Two vectors  
# create two vectors of equal length  
x = 1:10  
y = -5:4  
x + y # Add

## [1] -4 -2 0 2 4 6 8 10 12 14

x-y

## [1] 6 6 6 6 6 6 6 6 6 6

x\*y

## [1] -5 -8 -9 -8 -5 0 7 16 27 40

x/y

## [1] -0.2 -0.5 -1.0 -2.0 -5.0 Inf 7.0 4.0 3.0 2.5

x^y

## [1] 1.000000e+00 6.250000e-02 3.703704e-02 6.250000e-02 2.000000e-01  
## [6] 1.000000e+00 7.000000e+00 6.400000e+01 7.290000e+02 1.000000e+04

# check the length of each vector  
length(x)

## [1] 10

length(y)

## [1] 10

# Unequal length vectors  
x+c(1,2) # Shorter vector gets recycled!

## [1] 2 4 4 6 6 8 8 10 10 12

x+c (1,2,3)# If Longer vector is not "multiple" of shorter vector, a warning is given!

## Warning in x + c(1, 2, 3): longer object length is not a multiple of shorter  
## object length

## [1] 2 4 6 5 7 9 8 10 12 11

# Comparison also work on vector!  
x <= 5

## [1] TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE FALSE

x<y

## [1] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE

# Vector Comparison - "any" and "all"  
x = 10:1  
y = -4:5  
any(x<y)

## [1] TRUE

all(x<y)

## [1] FALSE

# The "nchar" function also acts on each element of vector.  
q = c("Hockey","Football","Baseball","Curlin","Rugby","Lacrosse",  
 "Basketball","Tennis","Cricket","Soccer")  
q

## [1] "Hockey" "Football" "Baseball" "Curlin" "Rugby"   
## [6] "Lacrosse" "Basketball" "Tennis" "Cricket" "Soccer"

nchar(q)

## [1] 6 8 8 6 5 8 10 6 7 6

nchar(y)

## [1] 2 2 2 2 1 1 1 1 1 1

?nchar()

## starting httpd help server ... done

# Subscripting:Accessing "individual elements" in vector is done using square brackets []  
x[1]

## [1] 10

x[1:2]

## [1] 10 9

x[c(1:5,9)]

## [1] 10 9 8 7 6 2

# Give Names to Vector!  
c(One = "a", Two = "y", Last = "r") # Name-Value pair

## One Two Last   
## "a" "y" "r"

# You can Name the vector after creating vector as well!  
w = 1:3  
names(w) = c("a","b","c")  
w

## a b c   
## 1 2 3