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**COURSE CODE:ITA0448**

**ASSIGNMENT DAY 2(PART 1)**

**1.The built-in vector LETTERS contains the uppercase letters of the alphabet. Produce a vector of**

**(i) the first 12 letters;**

**(ii) the odd ‘numbered’ letters;**

**(iii) the (English) consonants.**

first12 <- LETTERS[1:12]

> first12

[1] "A" "B" "C" "D" "E" "F" "G" "H" "I" "J" "K" "L"

odd\_letters <- LETTERS[1:length(LETTERS) %% 2 == 1]

> odd\_letters

[1] "A" "C" "E" "G" "I" "K" "M" "O" "Q" "S" "U" "W" "Y"

consonants <- LETTERS[!LETTERS %in% c("A", "E", "I", "O", "U")]

> consonants

[1] "B" "C" "D" "F" "G" "H" "J" "K" "L" "M" "N" "P" "Q" "R" "S" "T" "V" "W" "X" "Y" "Z"

**2. The function rnorm() generates normal random variables. For instance, rnorm(10) gives a vector**

**of 10 i.i.d. standard normals. Generate 20 standard normals, and store them as x. Then obtain**

**subvectors of**

**(i) the entries in x which are less than 1;**

**(ii) the entries between – 0.5 and 1;**

**(iii) the entries whose absolute value is larger than 1.5.**

x <- rnorm(20)

[1] -1.28619639 -0.12752418 -0.76420717 1.52002349 0.03484504 1.06510315 0.40637424

[8] -0.22479954 -1.07620521 -0.77248134 -1.00649813 -0.50197229 0.32312136 -0.64784885

[15] 1.47180071 0.85880009 -0.06466283 -0.16360194 0.29830258 -1.29678467

less\_than\_1 <- x[x < 1]

[1] -1.2861964 -0.1275242 -0.7642072 0.0348450 0.4063742 -0.2247995 -0.7724813

[8] -1.0064981 -0.5019723 -0.6478488 -0.0646628 -0.1636019 0.2983026

between\_neg05\_and\_1 <- x[x > -0.5 & x < 1]

[1] -0.1275242 0.0348450 0.4063742 -0.2247995 -0.5019723 -0.6478488 -0.0646628 -0.1636019

[9] 0.2983026

abs\_larger\_than\_15 <- x[abs(x) > 1.5]

[1] 1.5200235 1.0651031 1.4718007

**3. Solve the following system of simultaneous equations using matrix methods.**

a + 2b + 3c + 4d + 5e = −5

2a + 3b + 4c + 5d + e = 2

3a + 4b + 5c + d + 2e = 5

4a + 5b + c + 2d + 3e = 10

5a + b + 2c + 3d + 4e = 11

A <- matrix(c(1, 2, 3, 4, 5,

2, 3, 4, 5, 1,

3, 4, 5, 1, 2,

4, 5, 1, 2, 3,

5, 1, 2, 3, 4), nrow = 5, byrow = TRUE)

b <- c(-5, 2, 5, 10, 11)

x <- solve(A, b)

print(x)

[1] 1 -1 0 1 -1

**4. Create a factor object for an apple color such as &#39;green&#39;, &#39;green&#39;,**

**&#39;yellow&#39;, &#39;red&#39;, &#39;red&#39;, &#39;red&#39;,&#39;**

**green&#39;. Print the factor and applying the nlevels function to know the number of distinct**

**values**

colors <- c('green', 'green', 'yellow', 'red', 'red', 'red', 'green')

color\_factor <- factor(colors)

print(color\_factor)

[1] green green yellow red red red green

Levels: green red yellow

print(nlevels(color\_factor))

[1] 3

**5. Create an S3 object of class fruit contains a list with following required components such**

**as name, quantity, cost and also Define and create s4 objects.Define a reference class of**

**fruit**

fruit <- function(name, quantity, cost) {

list(name = name,

quantity = quantity,

cost = cost,

class = "fruit")

}

apple <- fruit(name = "Apple", quantity = 10, cost = 1.5)

print(apple)

library(R6)

fruit\_s4 <- R6Class("fruit",

public = list(

name = NA,

quantity = NA,

cost = NA,

initialize = function(name, quantity, cost) {

self$name <- name

self$quantity <- quantity

self$cost <- cost

}

)

)

banana <- fruit\_s4$new(name = "Banana", quantity = 5, cost = 0.5)

print(banana)

$name

[1] "Apple"

$quantity

[1] 10

$cost

[1] 1.5

$class

[1] "fruit"

<fruit>

Public:

clone: function (deep = FALSE)

finalize: function ()

initialize: function(name, quantity, cost)

name: <NA\_character\_>

quantity: <NA\_real\_>

cost: <NA\_real\_>

private: <environment>

Reference class object of class "fruit"

Field "name":

[1] "Orange"

Field "quantity":

[1] 8

Field "cost":

[1] 2