

```
#1 upperCase <- LETTERS lowerCase <- letters print(upperCase) print(lowerCase) #upperCase # [1] "A"
"B" "C" "D" "E" "F" "G" "H" "I" "J" "K" "L" "M" "N" "O" "P" "Q" "R" "S" "T" "U" "V" "W" # [24] "X"
"Y" "Z" #lowerCase # [1] "a" "b" "c" "d" "e" "f" "g" "h" "i" "j" "k" "l" "m" "n" "o" "p" "q" "r" "s" "t" "u"
"v" "w" # [24] "x" "y" "z"
```

```
#1a. x <- head(LETTERS, 11) print(x) # [1] "A" "B" "C" "D" "E" "F" "G" "H" "I" "J" "K"
```

```
#1b. odd_letters <- seq(from = 1, to = length(LETTERS), by = 2) odd <- LETTERS[odd_letters] print(odd)
# [1] "A" "C" "E" "G" "I" "K" "M" "O" "Q" "S" "U" "W" "Y"
```

```
#1c. vowels <- c("A", "E", "I", "O", "U") print(vowels) # [1] "A" "E" "I" "O" "U"
```

```
#1d. y <- tail(letters, 5) print(y) # [1] "v" "w" "x" "y" "z"
```

```
#1e. letter <- letters[15:24] print(letter) # [1] "o" "p" "q" "r" "s" "t" "u" "v" "w" "x"
```

```
#2 temperature <- c(avg_temp_tuguegarao = 42, avg_temp_manila = 39, avg_temp_iloilo = 34,
avg_temp_tacloban = 34, avg_temp_samal_island = 30, avg_temp_davao_city = 27) print(temperature)
#avg_temp_tuguegarao avg_temp_manila avg_temp_iloilo avg_temp_tacloban # 42 39 34 34
#avg_temp_samal_island avg_temp_davao_city # 30 27
```

```
#2a. city <- c("Tuguegarao City", "Manila", "Iloilo City", "Tacloban", "Samal Island", "Davao City") print(city)
# [1] "Tuguegarao City" "Manila" "Iloilo City" "Tacloban" "Samal Island"
# [6] "Davao City"
```

```
#2b. temp <- c(42, 39, 34, 34, 30, 27) print(temp) # [1] 42 39 34 34 30 27
```

```
#2c. df <- data.frame(city, temp) print(df) # city temp #1 Tuguegarao City 42 #2 Manila 39 #3 Iloilo City
34 #4 Tacloban 34 #5 Samal Island 30 #6 Davao City 27
```

```
#2d. names(df) <- c("City", "Temperature") print(df) # City Temperature #1 Tuguegarao City 42 #2
Manila 39 #3 Iloilo City 34 #4 Tacloban 34 #5 Samal Island 30 #6 Davao City 27
```

```
#2e. str(df) # 'data.frame': 6 obs. of 2 variables: # $ City : chr "Tuguegarao City" "Manila" "Iloilo City"
"Tacloban" ... # $ Temperature: num 42 39 34 34 30 27 # The data frame has 6 obs and 2 variables. The
data type of the variable "City" has a factor with 6 levels and the "Temperature" is a numeric variable.
```

```
#2f. df[3,] # for row 3 # City Temperature # 3 Iloilo City 34 df[4,] # City Temperature # 4 Tacloban 34
```

```
#2g. df[df$Temperature == max(df$Temperature), "City"] # [1] "Tuguegarao City" df[df$Temperature ==
min(df$Temperature), "City"] # [1] "Davao City"
```

USING MATRICES

```
#2a. mat <- matrix(c(1:8, 11:14), nrow=3, ncol=4, byrow = TRUE) mat # [,1] [,2] [,3] [,4] # [1,] 1 2 3 4 #
[2,] 5 6 7 8 # [3,] 11 12 13 14
```

```
#2b. mat <- matrix(c(1:8, 11:14), nrow=3, ncol=4, byrow = TRUE) mat_multiply <- mat*2 mat_multiply
# [,1] [,2] [,3] [,4] # [1,] 2 4 6 8 # [2,] 10 12 14 16 # [3,] 22 24 26 28
```

```
#2c. mat[2,] # [1] 5 6 7 8
```

```
#2d. mat[1:2, 3:4] # [,1] [,2] # [1,] 3 4 # [2,] 7 8
```

```
#2e. mat[3,2:3] # [1] 12 13
```

```
#2f. mat[,4] # [1] 4 8 14
```

```
#2g. rownames(mat_multiply) <- c("isa", "dalawa", "tatlo") colnames(mat_multiply) <- c("uno", "dos",
"tres", "cuatro") mat_multiply # uno dos tres cuatro # isa 2 4 6 8 # dalawa 10 12 14 16 # tatlo 22 24 26 28
```

```
#2h. dim(mat) <- c(6,2) mat # [,1] [,2] # [1,] 1 3 # [2,] 5 7 # [3,] 11 13 # [4,] 2 4 # [5,] 6 8 # [6,] 12 14
```

USING ARRAYS

```
#3a. p <- rep(c(1, 2, 3, 6, 7, 8, 9, 0, 3, 4, 5, 1), each=2) a <- array(p, dim=c(2,4,3)) a # , , 1
```

[,1] [,2] [,3] [,4]

[1,] 1 2 3 6

[2,] 1 2 3 6

, , 2

[,1] [,2] [,3] [,4]

[1,] 7 8 9 0

[2,] 7 8 9 0

, , 3

[,1] [,2] [,3] [,4]

[1,] 3 4 5 1

[2,] 3 4 5 1

#3b. Array has 3 dimensions.

#3c. `p <- rep(c(1, 2, 3, 6, 7, 8, 9, 0, 3, 4, 5, 1), each=2)` `h <- array(p,dim=c(2,4,3))` `row_names <- letters[1:2]`
`col_names <- LETTERS[1:4]` `dimnames(h) <- list(row_names, col_names, c("1st-Dimensional Array",`
`"2nd-Dimensional Array", "3rd-Dimensional Array"))` `h`

`#, , 1st-Dimensional Array`

A B C D

a 1 2 3 6

b 1 2 3 6

, , 2nd-Dimensional Array

A B C D

a 7 8 9 0

b 7 8 9 0

, , 3rd-Dimensional Array

A B C D

a 3 4 5 1

b 3 4 5 1