

Work Sheet #3a

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Exercise 1

There is a built-in vector **LETTERS** (uppercase letters) and **letters** (lowercase letters).

LETTERS:

- a. Produce a vector that contains the first 11 letters.

```
LETTERS[1:11]
```

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

- b. Produce a vector that contains the odd-numbered letters.

```
LETTERS[seq(1, 26, by = 2)]
```

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

- c. Produce a vector that contains the vowels.

```
LETTERS[LETTERS %in% c("A", "E", "I", "O", "U")]
```

```
## [1] "A" "E" "I" "O" "U"
```

letters:

- d. Produce a vector that contains the last 5 lowercase letters.

```
tail(letters, 5)
```

```
## [1] "v" "w" "x" "y" "z"
```

e. Produce a vector that contains lowercase letters 15 to 24.

```
letters[15:24]  
  
## [1] "o" "p" "q" "r" "s" "t" "u" "v" "w" "x"
```

Exercise 2

Create a vector with the average April temperatures in Tuguegarao City, Manila, Iloilo City, Tacloban, Samal Island, and Davao City.

a. Create a character vector for the cities.

```
city <- c("Tuguegarao City", "Manila", "Iloilo City", "Tacloban",  
        "Samal Island", "Davao City")  
city  
  
## [1] "Tuguegarao City" "Manila"           "Iloilo City"      "Tacloban"  
## [5] "Samal Island"     "Davao City"
```

b. Create a numeric vector of temperatures.

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

c. Create a dataframe combining city and temp.

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

d. Rename the dataframe columns to City and Temperature.

```
names(weather) <- c("City", "Temperature")
weather
```

```
##          City Temperature
## 1 Tuguegarao City        42
## 2           Manila       39
## 3      Iloilo City      34
## 4      Tacloban         34
## 5   Samal Island        30
## 6     Davao City        27
```

e. Print the structure of the dataframe.

```
str(weather)
```

```
## 'data.frame': 6 obs. of 2 variables:
##   $ City      : chr  "Tuguegarao City" "Manila" "Iloilo City" "Tacloban" ...
##   $ Temperature: num  42 39 34 34 30 27
```

f. Display rows 3 and 4.

```
weather[3:4, ]
```

```
##          City Temperature
## 3      Iloilo City      34
## 4      Tacloban         34
```

g. Display the city with highest and lowest temperature.

```
weather[which.max(weather$Temperature), ]
```

```
##          City Temperature
## 1 Tuguegarao City        42
```

```
weather[which.min(weather$Temperature), ]
```

```
##          City Temperature
## 6     Davao City        27
```

Exercise 3

Create a matrix of 1–8 and 11–14 with 4 columns and 3 rows.

a. Create the matrix.

```
m <- matrix(c(1:8, 11:14), nrow = 3, ncol = 4)
m

##      [,1] [,2] [,3] [,4]
## [1,]    1    4    7   12
## [2,]    2    5    8   13
## [3,]    3    6   11   14
```

b. Multiply the matrix by 2.

```
m2 <- m * 2
m2

##      [,1] [,2] [,3] [,4]
## [1,]    2    8   14   24
## [2,]    4   10   16   26
## [3,]    6   12   22   28
```

c. Display row 2.

```
m2[2, ]
## [1] 4 10 16 26
```

d. Display column 3 and 4 of rows 1 and 2.

```
m2[1:2, 3:4]

##      [,1] [,2]
## [1,]    14   24
## [2,]    16   26
```

e. Display columns 2 and 3 of row 3.

```
m2[3, 2:3]
## [1] 12 22
```

f. Display only column 4.

```
m2[, 4]
```

```
## [1] 24 26 28
```

g. Name the rows and columns.

```
rownames(m2) <- c("isa", "dalawa", "tatlo")
colnames(m2) <- c("uno", "dos", "tres", "quattro")
m2
```

```
##           uno dos tres quattro
## isa        2   8   14    24
## dalawa    4  10   16    26
## tatlo     6  12   22    28
```

h. Reshape the original matrix into 6 rows and 2 columns.

```
dim(m) <- c(6, 2)
m
```

```
##      [,1] [,2]
## [1,]     1    7
## [2,]     2    8
## [3,]     3   11
## [4,]     4   12
## [5,]     5   13
## [6,]     6   14
```

Exercise 4

An array contains: 1, 2, 3, 6, 7, 8, 9, 0, 3, 4, 5, 1 (repeat twice)

a. Create a 3D array with 2 rows, 4 columns, and 3 layers.

```
values <- rep(c(1,2,3,6,7,8,9,0,3,4,5,1), times = 2)
arr <- array(values, dim = c(2, 4, 3))
arr
```

```
## , , 1
##
##      [,1] [,2] [,3] [,4]
## [1,]     1     3     7     9
```

```

## [2,]    2    6    8    0
##
## , , 2
##
##      [,1] [,2] [,3] [,4]
## [1,]    3    5    1    3
## [2,]    4    1    2    6
##
## , , 3
##
##      [,1] [,2] [,3] [,4]
## [1,]    7    9    3    5
## [2,]    8    0    4    1

```

b. How many dimensions?

```
dim(arr)
```

```
## [1] 2 4 3
```

c. Add row, column, and layer names.

```

dimnames(arr) <- list(
  letters[1:2],
  LETTERS[1:4],
  c("1st-Dimensional Array", "2nd-Dimensional Array", "3rd-Dimensional Array")
)
arr

## , , 1st-Dimensional Array
##
##   A B C D
## a 1 3 7 9
## b 2 6 8 0
##
## , , 2nd-Dimensional Array
##
##   A B C D
## a 3 5 1 3
## b 4 1 2 6
##
## , , 3rd-Dimensional Array
##
##   A B C D
## a 7 9 3 5
## b 8 0 4 1

```