```r
1#vectors
```

```
## [1] 1
```

```r
#1.a
first_11_letters <- head(LETTERS, 11)
first_11_letters
```

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

```r
#1.b
odd_letters <- LETTERS[seq(1, 26, by = 2)]
odd_letters
```

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

```r
#1.c
vowels <- LETTERS[LETTERS %in% c("A", "E", "I", "O", "U")]
vowels
```

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

```r
#1.d
last_5_letters <- tail(letters, 5)
last_5_letters
```

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

```r
#1.e
letters_15_24 <- letters[15:24]
letters_15_24
```

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

```r
2#vectors
```

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

```r
#2.a
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"
```

```r
#2.b
temp <- c(42, 39, 34, 34, 30, 27)
temp
```

```
## [1] 42 39 34 34 30 27
```

```r
#2.c
df <- data.frame(city, temp)
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
```

```r
#2.d
names(df) <- c("City", "Temperature")
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
```

```r
#2.e
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
```

```r
#2.f
df[3:4, ]
```

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

```r
#2.g
max_temp_city <- df[which.max(df$Temperature), "City"]
min_temp_city <- df[which.min(df$Temperature), "City"]

print(paste("City with highest temperature:", max_temp_city))
```

```
## [1] "City with highest temperature: Tuguegarao City"
```

```r
print(paste("City with lowest temperature:", min_temp_city))
```

```
## [1] "City with lowest temperature: Davao City"
```

```r
2#matrices
```

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

```r
#2.a
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
```

```r
#2.b
m_times_two <- m * 2
m_times_two
```

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

```r
#2.c
m[2, ]
```

```
## [1]  2  5  8 13
```

```r
#2.d
m[1:2, 3:4]
```

```
##      [,1] [,2]
## [1,]    7   12
## [2,]    8   13
```

```r
#2.e
m[3, 2:3]
```

```
## [1]  6 11
```

```r
#2.f
m[, 4]
```

```
## [1] 12 13 14
```

```r
#2.g
rownames(m) <- c("isa", "dalawa", "tatlo")
colnames(m) <- c("uno", "dos", "tres", "quatro")
m
```

```
##        uno dos tres quatro
## isa      1   4    7     12
## dalawa   2   5    8     13
## tatlo    3   6   11     14
```

```r
#2.h
m_reshaped <- m
dim(m_reshaped) <- c(6, 2)
m_reshaped
```

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

```r
3#array
```

```
## [1] 3
```

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

```
## , , 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
```

```r
#3.b
length(dim(array_data))
```

```
## [1] 3
```

```r
#3.c
dimnames(array_data) <- list(c("a", "b"), c("A", "B", "C", "D"), c("1st", "2nd", "3rd"))
array_data
```

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