Week 1 - Quiz 1

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1. R was developed by statisticians working at

[ ] The University of New South Wales

[ ] Bell Labs

[x] The University of Auckland

[ ] Harvard University

2. The definition of free software consists of four freedoms (freedoms 0 through 3). Which of the following is NOT one of the freedoms that are part of the definition? Select all that apply.

[ ] The freedom to redistribute copies so you can help your neighbor.

[ ] The freedom to improve the program, and release your improvements to the public, so that the whole community benefits.

[x] The freedom to sell the software for any price.

[ ] The freedom to run the program, for any purpose.

[ ] The freedom to study how the program works, and adapt it to your needs.

[ ] The freedom to prevent users from using the software for undesirable purposes.

[ ] The freedom to restrict access to the source code for the software.

3. In R the following are all atomig data types EXCEPT: (Select all that apply)

[ ] table

[ ] complex

[x] matrix

[ ] numeric

[ ] character

[ ] list

[ ] array

[ ] data frame

[ ] logical

[ ] integer

4. If I execute the expression x <- 4 in R, what is the class of the object 'x' as determined by the 'class()' function?

```
x <- 4
class(x)
```

```
## [1] "numeric"
```

[ ] real

[ ] integer

[x] numeric

[ ] complex

[ ] vector

[ ] list

[ ] matrix

5. What is the class of the object defined by the expression x <- c(4, "a", TRUE)?

```
x <- c(4, "a", TRUE)
class(x)
```

```
## [1] "character"
```

[ ] integer

[ ] numeric

[x] character

[ ] mixed

[ ] logical

6. If I have two vectors x<- c(1, 3, 5) and y <- c(3, 2, 10), what is produced by the expression cbind(x, y)?

```
x <- c(1, 3, 5); y <- c(3, 2, 10)
cbind(x, y)
```

```
##      x  y
## [1,] 1  3
## [2,] 3  2
## [3,] 5 10
```

[ ] a vector of length 3

[ ] a 2 by 2 matrix

[x] a matrix with 2 columns and 3 rows

[ ] a 2 by 3 matrix

[ ] a vector of length 2

[ ] a 3 by 3 matrix

7. A key property of vectors in R is that

[ ] the length of a vector must be less than 32,768

[x] elements of a vector all must be of the same class

[ ] a vector cannot have have attributes like dimensions

[ ] elements of a vector can only be character or numeric

[ ] elements of a vector can be of different classes

8. Suppose I have a list defined as x <- list(2, "a", "b", TRUE). What does x[[1]] give me? Select all that apply.

```
x <- list(2, "a", "b", TRUE)
x[[1]]
```

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

[ ] a character vector containing the element "2".

[ ] a numeric vector of length 1.

[ ] a list containing the number 2.

[ ] a list containing the letter "a".

[x] a numeric vector containing the element 2.

9. Suppose I have a vector x <- 1:4 and a vector y <- 2. What is produced by the expression x + y?

```
x <- 1:4; y <- 2
x + y
```

```
## [1] 3 4 5 6
```

[x] a numeric vector with elements 3, 4, 5, 6.

[ ] a numeric vector with elements 1, 2, 3, 6.

[ ] an integer vector with elements 3, 2, 3, 6.

[ ] a numeric vector with elements 3, 2, 3, 4.

[ ] a numeric vector with elements 3, 2, 3, 6.

[ ] an integer vector with elements 3, 2, 3, 4.

10. Suppose I have a vector x <- c(3, 5, 1, 10, 12, 6) and I want to set all elements of this vector that are less than 6 to be equal to zero. What R core achieves this? Select all that apply.

```
# x[x >= 6] <- 0
x <- c(3, 5, 1, 10, 12, 6)
x[x >= 6] <- 0
ifelse(sum(x[c(4, 5, 6)]) == 0, TRUE, FALSE)
```

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

```
# x[x > 6] <- 0
x <- c(3, 5, 1, 10, 12, 6)
x[x > 6] <- 0
ifelse(sum(x[c(4, 5, 6)]) == 0, TRUE, FALSE)
```

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

```r
# x[x != 6] <- 0
x <- c(3, 5, 1, 10, 12, 6)
x[x != 6] <- 0
ifelse(sum(x[c(4, 5, 6)]) == 0, TRUE, FALSE)
```

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

```r
# x[x %in% 1:5] <- 0
x <- c(3, 5, 1, 10, 12, 6)
x[x %in% 1:5] <- 0
ifelse(sum(x[c(4, 5, 6)]) == 0, TRUE, FALSE)
```

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

```r
# x[x <= 5] <- 0
x <- c(3, 5, 1, 10, 12, 6)
x[x <= 5] <- 0
ifelse(sum(x[c(4, 5, 6)]) == 0, TRUE, FALSE)
```

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

```r
# x[x < 6] <- 0
x <- c(3, 5, 1, 10, 12, 6)
x[x < 6] <- 0
ifelse(sum(x[c(4, 5, 6)]) == 0, TRUE, FALSE)
```

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

```r
# x[x == 6] <- 0
x <- c(3, 5, 1, 10, 12, 6)
x[x == 6] <- 0
ifelse(sum(x[c(4, 5, 6)]) == 0, TRUE, FALSE)
```

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

```r
# x[x == 0] <- 6
x <- c(3, 5, 1, 10, 12, 6)
x[x == 0] <- 6
ifelse(sum(x[c(4, 5, 6)]) == 0, TRUE, FALSE)
```

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

```r
# x[x < 6] == 0
x <- c(3, 5, 1, 10, 12, 6)
x[x < 6] == 0
```

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

```r
ifelse(sum(x[c(4, 5, 6)]) == 0, TRUE, FALSE)
```

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

```r
# x[x > 0] <- 6
x <- c(3, 5, 1, 10, 12, 6)
x[x > 0] <- 6
ifelse(sum(x[c(4, 5, 6)]) == 0, TRUE, FALSE)
```

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

```r
# x[x == 0] < 6
x <- c(3, 5, 1, 10, 12, 6)
x[x == 0] < 6
```

```
## logical(0)
```

```r
ifelse(sum(x[c(4, 5, 6)]) == 0, TRUE, FALSE)
```

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

[x] x[x >= 6] <- 0

[x] x[x > 6] <- 0

[ ] x[x != 6] <- 0

[ ] x[x %in% 1:5] <- 0

[ ] x[x <= 5] <- 0

[ ] x[x < 6] <- 0

[ ] x[x == 6] <- 0

[ ] x[x == 0] <- 6

[ ] x[x < 6] == 0

[ ] x[x > 0] <- 6

[ ] x[x == 0] < 6

11. Use the Week 1 Quiz Data Set to answer questions 11-20.

In the dataset provided for this Quiz, what are the column names of the dataset?

```r
dt <- read.csv("hw1_data.csv")
names(dt)
```

```
## [1] "Ozone"   "Solar.R" "Wind"    "Temp"    "Month"   "Day"
```

[x] Ozone, Solar.R, Wind, Temp, Month, Day

[ ] Month, Day, Temp, Wind

[ ] Ozone, Solar.R, Wind

[ ] 1, 2, 3, 4, 5, 6

12. Extract the first 2 rows of the data frame and print them to the console. What does the output look like?

```r
head(dt, 2)
```

```
##   Ozone Solar.R Wind Temp Month Day
## 1    41     190  7.4   67     5   1
## 2    36     118  8.0   72     5   2
```

13. How manu observations (i.e. rows) are in this data frame?

```r
nrow(dt)
```

```
## [1] 153
```

[ ] 160

[ ] 45

[x] 153

[ ] 129

14. Extract the last 2 rows of the data frame and print them to the console. What does the output look like?

```
tail(dt, 2)
```

```
##     Ozone Solar.R Wind Temp Month Day
## 152    18     131  8.0   76     9  29
## 153    20     223 11.5   68     9  30
```

15. What is the value of Ozone in the 47th row?

```
dt$Ozone[47]
```

```
## [1] 21
```

[ ] 18

[x] 21

[ ] 63

[ ] 34

16. How manu missing values are in the Ozone column of this data frame?

```
sum(is.na(dt$Ozone))
```

```
## [1] 37
```

[ ] 9

[ ] 43

[ ] 78

[x] 37

17. What is the mean of the Ozone column in this dataset? Exclude missing values (coded as NA) from this calculation.

```
mean(dt$Ozone, na.rm = TRUE)
```

```
## [1] 42.12931
```

[ ] 18.0

[ ] 31.5

[ ] 53.2

[x] 42.1

18. Extract the subset of rows of the data frame where Ozone values are above 31 and Temp values are above 90.

```
dt2 <- dt[(dt$Ozone > 31 & dt$Temp>90), ]
mean(dt2$Solar.R, na.rm = TRUE)
```

```
## [1] 212.8
```

[ ] 185.9

[ ] 205.0

[ ] 334.0

[x] 212.8

19. What is the mean of "Temp" when "Month" is equal to 6?

```
dt.temp <- dt$Temp[which(dt$Month == 6)]
mean(dt.temp, na.rm = TRUE)
```

```
## [1] 79.1
```

[ ] 75.3

[ ] 90.2

[ ] 85.6

[x] 79.1

20. What was the maximum ozone value in the month of May (i.e. Month is equal to 5)?

```
dt.oz <- dt$Ozone[which(dt$Month == 5)]
max(dt.oz, na.rm = TRUE)
```

```
## [1] 115
```

[x] 115

[ ] 18

[ ] 97

[ ] 100