Week 1: Answers

Question 1

We are in the midst of a medical crisis! The deadly corona virus that originated in China has infected hundreds of people and is now spreading across the globe at an alarming rate. World Health Organization (WHO) alerted the world about the Novel Corona virus(2019-nCoV) in January, 2020. After issuance of the global alert, a formal reporting of Corona cases was put in place, and WHO published daily reports on the number of cases on their website here. Use WHO: Situation Report-21 for this question.

Table 1 reports the confirmed cases of 2019-nCoV reported by provinces, regions and cities in China (see slide 47).

   i) Enter confirmed cases in table 1 to a vector.

```r
confirmed_cases <- c(29631, 1151, 1104, 1073, 879, 830, 771, 492, 468, 459, 405,
                     337, 331, 295, 261, 218, 213, 210, 141, 136, 119, 109, 107,
                     91, 85, 80, 58, 49, 49, 36, 18, 18, 10, 1)
sum(confirmed_cases) # This is to check if the Total match with the Total given in Table 1
```

```
[1] 40235
```

```
confirmed_cases
```

```
 [1] 29631  1151  1104  1073   879   830   771   492   468   459   405   337
[13]   331   295   261   218   213   210   141   136   119   109   107    91
[25]    85    80    58    49    49    36    18    18    10     1
```

   ii) Name the elements by province/regions/cities in China.

```r
names(confirmed_cases) <- c("Hubei", "Guangdong", "Zhejiang", "Henan", "Hunan", "Anhui",
                            "Jiangxi", "Jiangsu", "Chongqing", "Shandong", "Sichuan",
                            "Beijing", "Heilongjiang", "Shanghai", "Fujian", "Hebei",
                            "Shaanxi", "Guangxi", "Yunnan", "Hainan", "Shanxi",
                            "Guizhou", "Liaoning", "Tianjin", "Gansu", "Jilin",
                            "Inner Mongolia", "Ningxia",
                            "Xinjiang", "Hong Kong SAR", "Qinghai",
                            "Taipei and environs",
                            "Macao SAR", "Xizang")
```

   iii) Write R codes to answer the following questions.

   • Which province/region/city has the highest number of confirmed cases?

```r
# Method 1
which.max(confirmed_cases) # Returns the name of the district and index in the confirmed cases
```

```
Hubei
    1
```

```
# Method 2
confirmed_cases[confirmed_cases == max(confirmed_cases)] # Returns the name of the district
```

```
Hubei
29631
```

If it is difficult to understand how the method 2 work, here is the step by step illustration of Method 2.

```
max(confirmed_cases)
```

```
[1] 29631
```

```
confirmed_cases == max(confirmed_cases)
```

Hubei	Guangdong	Zhejiang	Henan
TRUE	FALSE	FALSE	FALSE
Hunan	Anhui	Jiangxi	Jiangsu
FALSE	FALSE	FALSE	FALSE
Chongqing	Shandong	Sichuan	Beijing
FALSE	FALSE	FALSE	FALSE
Heilongjiang	Shanghai	Fujian	Hebei
FALSE	FALSE	FALSE	FALSE
Shaanxi	Guangxi	Yunnan	Hainan
FALSE	FALSE	FALSE	FALSE
Shanxi	Guizhou	Liaoning	Tianjin
FALSE	FALSE	FALSE	FALSE
Gansu	Jilin	Inner Mongolia	Ningxia
FALSE	FALSE	FALSE	FALSE
Xinjiang	Hong Kong SAR	Qinghai	Taipei and environs
FALSE	FALSE	FALSE	FALSE
Macao SAR	Xizang		
FALSE	FALSE		

```
confirmed_cases[confirmed_cases == max(confirmed_cases)]
```

```
Hubei
29631
```

If you do not understand a big line of code, it is always a good idea to break it down to small pieces and check the output.

- Number of confirmed cases reported in Hebei, China.

```
confirmed_cases["Hebei"]
```

```
Hebei
  218
```

- Total number of confirmed cases reported in China

```r
sum(confirmed_cases)
```

```
[1] 40235
```

- Number of cases reported in the capital of China

```r
confirmed_cases["Beijing"]
```

```
Beijing
    337
```

- Number of cases reported in Inner Mongolia

```r
confirmed_cases["Inner Mongolia"]
```

```
Inner Mongolia
            58
```

Question 2

Table 2 reports the confirmed 2019-nCoV cases and deaths in China, Singapore, Republic of Korea, Japan, Malaysia, Australia, Viet Nam, Philippines, Cambodia, Thailand, India, Nepal, Sri Lanka, United States of America, Canada, Germany, France, The United Kingdom, Italy, Russian Federation, Spain , Belgium, Finland, Sweden, UAE as `a <- c(40235, 43, 27, 26, 18, 15, 14, 3, 1, 32, 3, 1, 1, 12, 7, 14, 11, 4, 3, 2, 2, 1, 1, 100, 7)`.

Table 2-please see slide 50.

i) Rename the vector a as confirmed_cases_countries

```r
a <- c(40235, 43, 27, 26, 18, 15, 14, 3, 1, 32, 3, 1, 1, 12, 7, 14, 11, 4, 3, 2, 2, 1, 1, 100, 7)
confirmed_cases_countries <- a
confirmed_cases_countries
```

```
 [1] 40235    43    27    26    18    15    14     3     1    32     3     1
[13]     1    12     7    14    11     4     3     2     2     1     1   100
[25]     7
```

ii) Name elements according to the associated country

```r
names(confirmed_cases_countries) <- c("China", "Singapore", "Republic of Korea", "Japan",
                                      "Malaysia", "Australia", "Viet Nam", "Philippines",
                                      "Cambodia", "Thailand", "India", "Nepal", "Sri Lanka",
                                      "United States of America", "Canada", "Germany", "France",
                                      "The United Kingdom", "Italy", "Russian Federation", "Spain",
                                      "Belgium", "Finland", "Sweden", "UAE")
confirmed_cases_countries
```

```
                 China              Singapore     Republic of Korea
                 40235                     43                    27
                 Japan               Malaysia             Australia
                    26                     18                    15
              Viet Nam            Philippines              Cambodia
                    14                      3                     1
              Thailand                  India                 Nepal
                    32                      3                     1
             Sri Lanka United States of America              Canada
                     1                     12                     7
               Germany                 France    The United Kingdom
                    14                     11                     4
                 Italy     Russian Federation                 Spain
                     3                      2                     2
               Belgium                Finland                Sweden
                     1                      1                   100
                   UAE
                     7
```

iii) Mistakenly 100 cases were recorded to Sweden, correct it.

```r
confirmed_cases_countries["Sweden"] <- 1
# Let's check the vector again. Now Sweden reads as 1.
confirmed_cases_countries
```

```
                 China              Singapore     Republic of Korea
                 40235                     43                    27
                 Japan               Malaysia             Australia
                    26                     18                    15
              Viet Nam            Philippines              Cambodia
                    14                      3                     1
              Thailand                  India                 Nepal
                    32                      3                     1
             Sri Lanka United States of America              Canada
                     1                     12                     7
               Germany                 France    The United Kingdom
                    14                     11                     4
                 Italy     Russian Federation                 Spain
                     3                      2                     2
               Belgium                Finland                Sweden
                     1                      1                     1
                   UAE
                     7
```

iv) Add the record of "other" category into your vector.

```r
confirmed_cases_countries <- c(confirmed_cases_countries, 70)
names(confirmed_cases_countries)[length(confirmed_cases_countries)] <-
  "International conveyance (Japan)"
confirmed_cases_countries
```

```
                 China                           Singapore
```

```
                     40235                                       43
          Republic of Korea                                   Japan
                        27                                       26
                  Malaysia                                 Australia
                        18                                       15
                  Viet Nam                               Philippines
                        14                                        3
                  Cambodia                                  Thailand
                         1                                       32
                     India                                     Nepal
                         3                                        1
                 Sri Lanka              United States of America
                         1                                       12
                    Canada                                   Germany
                         7                                       14
                    France                    The United Kingdom
                        11                                        4
                     Italy                    Russian Federation
                         3                                        2
                     Spain                                   Belgium
                         2                                        1
                   Finland                                    Sweden
                         1                                        1
                       UAE International conveyance (Japan)
                         7                                       70
```

v) Create a new vector to enter WHO regions

```r
WHO_Region <- c(rep("Western Pacific Region", 9),
          rep("South-East Asia Region", 4),
          rep("Region of Americas", 2),
          rep("Europe Region", 9),
          rep("Eastern Mediterranean Region", 1),
          rep("Other", 1))
WHO_Region
```

```
 [1] "Western Pacific Region"       "Western Pacific Region"
 [3] "Western Pacific Region"       "Western Pacific Region"
 [5] "Western Pacific Region"       "Western Pacific Region"
 [7] "Western Pacific Region"       "Western Pacific Region"
 [9] "Western Pacific Region"       "South-East Asia Region"
[11] "South-East Asia Region"       "South-East Asia Region"
[13] "South-East Asia Region"       "Region of Americas"
[15] "Region of Americas"           "Europe Region"
[17] "Europe Region"                "Europe Region"
[19] "Europe Region"                "Europe Region"
[21] "Europe Region"                "Europe Region"
[23] "Europe Region"                "Europe Region"
[25] "Eastern Mediterranean Region" "Other"
```

vi) New cases have been reported in China, Singapore, Malaysia, The United Kingdom, Spain. Create a new vector to code these countries as TRUE and the rest as FALSE

```
country_names_new_cases <- c("China", "Singapore", "Malaysia", "The United Kingdom", "Spain")
new_cases <- names(confirmed_cases_countries) %in% country_names_new_cases
new_cases
```

```
 [1]  TRUE  TRUE FALSE FALSE  TRUE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
[13] FALSE FALSE FALSE FALSE FALSE  TRUE FALSE FALSE  TRUE FALSE FALSE FALSE
[25] FALSE FALSE
```