Homework 6 Matrices, apply-functions

1. (20 points, 5 points each)
    a. Create vector 1:30 and transform it into a matrix M with 5 rows and 6 columns. Fill the matrix by row.
    b. Name the rows and the columns of matrix M, so the resulting matrix looks like as follows

```
                     Day #1 Day #2 Day #3 Day #4 Day #5 Day #6
Production Line #1      1      2      3      4      5      6
Production Line #2      7      8      9     10     11     12
Production Line #3     13     14     15     16     17     18
Production Line #4     19     20     21     22     23     24
Production Line #5     25     26     27     28     29     30
```

    Choose one of the two options:
    - use functions **rownames**, **colnames**, and their options **do.NULL** and **prefix**
    - use functions **dimnames()** and **paste().**

    c. Using indexing, access all elements in the 4th row ('Production Line #4') of matrix M. Preserve the matrix structure, so the result is as follows.

```
                    Day #1 Day #2 Day #3 Day #4 Day #5 Day #6
Production Line #4     19     20     21     22     23     24
```

    d. Use function **rowSums** to find the total of each row of matrix M and, using the function **cbind()**, add one more column to matrix M. Name the column "Total".

2. (15 points, 5 points each)
    a. Create an empty matrix of size 10 by 5.
    b. Use function **apply()** to fill the matrix with 5 random samples of size 10 from the standard normal distribution, so that the samples are in the columns of the matrix. Note: use function **rnorm**(n=…,mean=0,sd=1) to generate a random sample from a normal distribution. Display the result.
    c. Use function **apply()** to find the standard deviations of the 5 samples listed in the columns of the matrix from part b. Display the result.

3. (15 points, 5 points each)
    a. Use **read_excel** function from package **readxl** to download the data **crime_rate.xlsx**. Create a data frame named **Crime.rate**. Do not forget to load the package.
    b. Arrange the rows of the data frame **Crime.rate** so that violent crimes are listed in the decreasing order. Name the new data frame **Crime.rate.sorted**.
    c. Use function **write_xlsx** from package **writexl** (do not forget to load it first) to save data frames **Crime.rate** and **Crime.rate.sorted** in two different sheets of the new file **crime_rate_updated.xlsx**. Name the first sheet "Original" and the second one "Sorted".