MATLAB Additional Exercises

1. Celsius temperatures can be converted to Fahrenheit by multiplying by 9, dividing by 5, and adding 32. Assign a variable called \( C \) the value 37, and implement this formula to assign a variable \( F \) the Fahrenheit equivalent of 37 Celsius.

2. Set up a vector called \( t \) with five elements having the values: 1, 2, 3, 4, 5. Using \( t \), create assignment statements for a vector \( x \) which will result in \( x \) having these values:
   a) 2, 4, 6, 8, 10
   b) 1/2, 1, 3/2, 2, 5/2
   c) 1, 1/2, 1/3, 1/4, 1/5
   d) 1, 1/4, 1/9, 1/16, 1/25

3. Create a vector of the even whole numbers between 31 and 75.

4. Write a command that substitutes the 3rd row of matrix \( A \) with the 5th row of matrix \( B \) (use square matrixes of size 5x5).

5. Write a command that substitutes the 2nd column of matrix \( A \) with the 5th row of matrix \( B \) (use square matrixes of size 5x5).

6. Let \( x = \begin{bmatrix} 2 & 5 & 1 & 6 \end{bmatrix} \).
   a. Add 16 to each element
   b. Add 3 to just the odd-index elements
   c. Compute the square root of each element
   d. Compute the square of each element

7. Let \( x = \begin{bmatrix} 3 & 2 & 6 & 8 \end{bmatrix} \) and \( y = \begin{bmatrix} 4 & 1 & 3 & 5 \end{bmatrix} \) (\( x \) and \( y \) should be column vectors).
   a. Add the sum of the elements in \( x \) to \( y \)
   b. Raise each element of \( x \) to the power specified by the corresponding element in \( y \).
   c. Divide each element of \( y \) by the corresponding element in \( x \)
   d. Multiply each element in \( x \) by the corresponding element in \( y \), calling the result "z".
   e. Add up the elements in \( z \) and assign the result to a variable called "w".
   f. Compute \( x^*y - w \) and interpret the result ans.

8. Create an \( m \) by \( n \) matrix in MATLAB (use the \text{rand} function). Access each element of the matrix and set any value that is less than 0.5 to 0 and any value that is greater than (or equal) 0.5 to 1.

9. Write a MATLAB function that takes an integer as input and then build an \( n \) by \( n \) matrix with the numbers 1, 2, 3, \ldots, \( n \), on the main diagonal and zeros everywhere else.
10. Write a MATLAB function that takes an matrix $x$ of size $n$ by $n$ as input and
returns a matrix $y$ constructed as follows:

$$y_{ij} = \frac{x_{ij}+x_{ji}}{2}$$

11. Write a MATLAB function that finds the first negative element of the following
vector using a while loop:

$$x = [1\ 3\ 4\ -2\ -4\ 8\ -7] \quad (1)$$

12. Write a MATLAB function that finds the first even number in the following vector
using a while loop:

$$x = [1\ 3\ -6\ 7\ 8\ 2] \quad (2)$$