# Programming and Problem Solving Final Assignment.

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Description automatically generated No AI use

# Introduction to MATLAB

These are done interactively at the Command Window. Insert a screenshot showing the results below the assignment.

**NOTE:** Choose 3 of the following:

1. There are 1.6093 kilometers in a mile. Create a variable to store the number of miles. Convert this to kilometers, and store in another variable.
2. The following assignment statements either contain at least one error or could be improved in some way. Assume that *radius* is a variable that has been initialized. First, identify the problem, and then fix and/or improve them:
   1. 33 = number
   2. my variable = 11.11;
   3. area = 3.14 \* radius^2;
   4. x = 2 \* 3.14 \* radius;
3. Create two variables x and y and store numbers in them. Write an expression that would be **true** if the value of x is greater than five or if the value of y is less than ten, but not if both of those are **true**.
4. A company manufactures a part for which there is a desired weight. There is a tolerance of N percent, meaning that the range between minus and plus N% of the desired weight is acceptable.
   1. Create a variable that stores a weight, and another variable for N (e.g., set it to 2).
   2. Create variables that store the minimum and maximum values in the acceptable range of weights for this part.

# Vectors and Matrices

You can do these interactively or in a script. Insert a screenshot showing the results below the assignment.

**NOTE:** Choose 3 of the following:

1. Create a vector in three different ways: using just square brackets, using the colon operator, and using linspace;

vec =

5 7 9 11

1. Create a variable *myend*, which stores a random integer in the inclusive range from 5 to 9. Using the colon operator, create a vector that iterates from 1 to *myend* in steps of 3.
2. Using the colon operator and the transpose operator, create a column vector *myvec* that has the values -1 to 1 in steps of 0.5.
3. Generate a 2 x 4 matrix variable mat. Replace the first row with 1:4. Replace the third column (you decide with which values).
4. Why would the following code produce an error message? Explain what each statement does or attempts to do.

mat = [ 1 : 3 ; 4 : 6 ];

mat ( : , 2 ) = [ 3 7 11]’

1. Create a vector x which consists of 20 equally spaced points in the range from **-π** to **+π**. Create a y vector which is sin(x).
2. Create a 3 x 5 matrix with random integers ranging from -10 to +10. Perform each of the following.
3. Find the maximum value in each column.
4. Find the maximum value in each row.
5. Find the maximum value in the entire matrix.
6. Subtract 3 from each element.
7. Count how many are positive.

# MATLAB Programming

Attach the script file. Insert a screenshot showing the successful run of the program below the assignment.

**NOTE:** Choose 3 of the following:

1. Write a script that will prompt the user for a number and print it twice, once with three decimal places, and then with one decimal place.
2. A power company charges 6.6 cents per kilowatt-hour (KWH) for providing electricity. Write a script “power\_charge” that uses a function to calculate and return the charge for the month.
   1. Prompt the user for the number of KWH used in a given month.
   2. Create a power\_calc function that takes in the KWH and returns the charge for the month.
   3. Print the charge for the month in dollars, in the following format. (The conversion is 100 cents in one dollar.)

Example run:

A black text on a white background

AI-generated content may be incorrect.

1. Write a script that gets values from the user for the x and y coordinate of a point. Plot this using a large red circle.

Example run:

A close up of black text

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A screenshot of a computer

AI-generated content may be incorrect.

1. Write a program with a function that converts inches to feet. Note that 12 inches = 1 foot.

# GUI App

**NOTE:** Choose 1 of the following:

1. Create a GUI App version of the app from the previous assignment. A power company charges 6.6 cents per kilowatt-hour (KWH) for providing electricity. Write a script “power\_charge” that uses a function to calculate and return the charge for the month.
   1. Prompt the user for the number of KWH used in a given month.
   2. Create a power\_calc function that takes in the KWH and returns the charge for the month.
   3. Print the charge for the month in dollars, in the following format. (The conversion is 100 cents in one dollar.)
2. Create a GUI app that generates a random number within a specified range.
3. Input fields for minimum and maximum values.
4. Button to generate the number.
5. Display area for the random number.