Week 2 Session 5

User Defined Functions, Selection Statement

Task 1

Write a Matlab **user defined function** to plot a parabolic antenna with the given diameter D and focal point F (y= x^2/4f)

1. Define the function name as **plot_antenna**. This function should have two inputs **D** and **F**.
2. In the function body, generate a fully labelled plot. Include the D and F values in the dynamic title.
3. After finishing, save the m-file to C:\Documents:\Matlab. Then in the Command Window, type **plot_antenna(100,20)** to generate a plot.

Task 2

Write a Matlab program to analyze the "daily rainfall data.txt".

1. Read the data to a MATLAB variable **rain**.
2. Define three variables **rainMax**, **rainMin**, and **rainAve** to store the maximum rainfall, minimum rainfall, and average rainfall respectively.
3. Write a Matlab command to allow users to input a value in Command Window and save the user input to a variable named **level**.
4. Use if-else statement to display a message to users based on their input value:
   - If the input value is less than the minimum rainfall, display a message "too little";
   - If the input value is greater than the maximum rainfall, display a message "too much";
   - If the input value is within $\pm 20\%$ of the average rainfall, display a message "close to average";
   - For all other cases, display a message "normal".

Task 3

Write a Matlab command to allow users to input a value in Command Window. Save the user input to a variable named **x**. Based on the **x**, calculate **y** using the following equations and display the result in Command Window.

$$y = \begin{cases} |x| & if\ x < 0 \\ 15 - 3x & if\ 0 \le x \le 5 \\ x^2 & if\ x > 5 \end{cases}$$

Task 4

Write a MATLAB program to design a Customer Satisfaction Survey (use switch-case):

- If a customer clicks 5 on the machine, display a message "Extremely happy";
- If a customer clicks 4 on the machine, display a message "Happy";
- If a customer clicks 3 on the machine, display a message "Neutral";
- If a customer clicks 2 on the machine, display a message "Unhappy";
- If a customer clicks 1 on the machine, display a message "Extremely unhappy";
- If a customer clicks other numbers, display a message "Invalid".

Task 5

Write a Matlab **user defined function** to plot a circle with the given given radius R.

1. Define the function name as **plot_circle**. This function should have one inputs **R**.
2. In the function body, generate a fully labelled plot. Use the dynamic title to show the area of the circle (πR^2).
3. After finishing, save the m-file to C:\Documents:\Matlab. Then in the Command Window, type **plot_circle (5)** to generate a plot.

Task 6

Write a Matlab command to allow users to input a value in Command Window. Save the user input to a variable named **flag**. Use switch-case statement to decide:

- If flag is 1, generate a parabolic antenna using **plot_ antenna** with diameter of 100mm, focal point of 20mm (refer to Task 1);
- If flag is 2, generate a circle using **plot_circle** with radius of 50mm (refer to Task 5).
- Otherwise, display a message “Invalid Input”.