

# **MATLAB Mathematical Functions**

## **LAB 2**

**ENGG100 - Spring 2024**



# Lab 2 Objectives

- Use different methods to display information/messages to the user
- Use MATLAB arithmetic functions to solve real-world problems
- Comment code clearly and efficiently
- Write a short program that takes an input from a user, calculates a value and returns/displays a value to the user, while commenting the code clearly

# Displaying “Hello World”

“Hello World” is traditionally the first program written in any new programming language or environment.

MATLAB has different ways of displaying messages to the user - try the below functions:

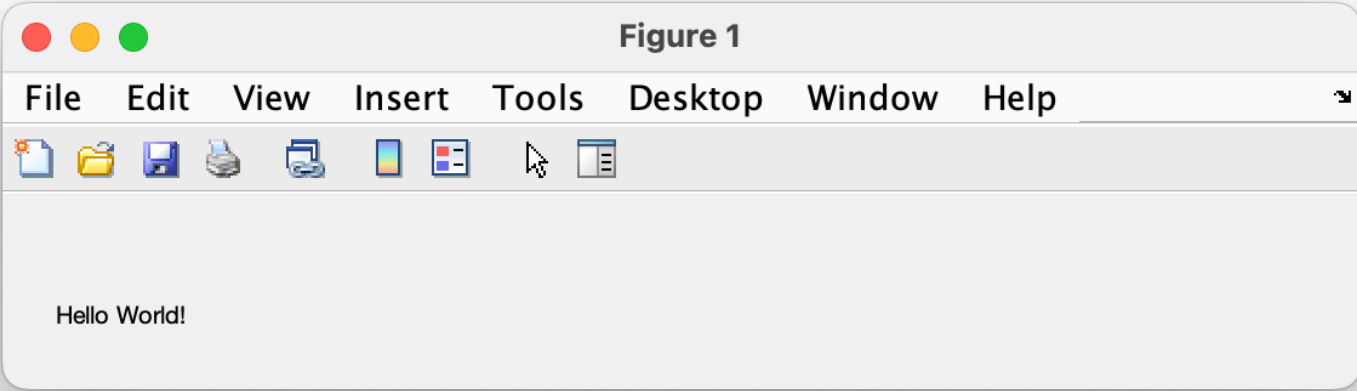
- Using the **display** function - `disp('Hello World!')`
- Using the **message box** function - `msgbox('Hello World!', 'Hello')`
- Using the **help dialog box** function - `helpdlg('Hello World!', 'Help Dialog Box')`
- Using **graphical user interface (GUI)** - `uicontrol('Style','Text','String','Hello World');`

# Different Display Functions

```
>> disp('Hello World')  
Hello World
```

This displays the text in the command window

```
>> uicontrol('Style','text','String','Hello World!');  
fx>>
```



This creates a user interface control.

The syntax is

```
uicontrol(PropertyName1, value1,  
PropertyName2, value2, ...)
```

Some properties include: style-radio button,  
style-slider, style-popupmenu

```
>> msgbox('Hello World!', 'Hello');  
fx>>
```



This displays the text in a dialog box.

The syntax is msgbox(message, title)

```
>> helpdlg('Hello World!', 'Help Dialog Box');  
fx>>
```



This displays the text in a dialog box.

The syntax is helpdlg(helpstring,  
dlgname)



# TASK 1

- What is the surface area of a closed cylinder with height 30cm and radius 5cm:

$$SA = 2\pi r^2 + 2\pi rh$$

- **Hint:** Make sure you use brackets for multiple operations and use meaningful variable names, e.g. 'surface\_area, height, radius'

# TASK 2

Using the law of cosines, the third side of a triangle with sides  $a$ ,  $b$ , and angle between them is  $\theta$ :

$$c = \sqrt{a^2 + b^2 - 2ab \cos \theta}$$

Find the third side of a triangle using the formula above with:

- **a** = first number of your student ID
- **b** = last 2 numbers of your student ID
- **theta** =  $\pi/4$

# Commenting in MATLAB

- Commenting is useful to add extra information without affecting your code
- A comment must be preceded with a % sign. Example:

```
a = sqrt(b^2+c^2) % calculate hypotenuse
```

# TASK 3

Write a short script that performs the below tasks, and make sure you comment each line to explain what your code does at each step.

1. Set the initial values of the following variables:

- **Radius** = first digit of your student ID
- **Height** = second & third digits of your student ID
- **Density** = last number of your student ID

2. Calculate **area** =  $\pi * \text{radius}^2$

3. Calculate **volume** =  $\text{area} * \text{height}$

4. Calculate **mass** =  $\text{volume} * \text{density}$



# TASK 4

A phone costs **\$950** to buy outright. However, if you sign a **three-year contract** with telecommunications company A, you can get the phone for **\$80 a month**, with **\$500 monthly credit**. Telecommunications company B offers a **bring-your-own-phone** plan at **\$20 a month** for the **same amount of monthly credit**. How much will you pay for each option over **3 years**?

**Hint:** You will need to create the variables below and add comments to each line to explain the calculations:

- `phone_cost`
- `pay_duration`
- `pay_month_A`
- `pay_month_B`
- `total_A`
- `total_B`

# Bonus Task

- Write a short program to convert from feet-and-inches to meters
- Request two inputs from the user (feet, then inches) using the input function
- Determine and implement an equation for the conversion for both values to meters
- Display the solution to the user using the `disp()` function
- Add a comment to each line to explain your code