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PW0: MATLAB/Simulink Basics

Objective:

The objective of this Practical Work (PW) is to help students understand the basics and initiations of MATLAB/Simulink programming, also to design systems with Simulink blocks.

Description:

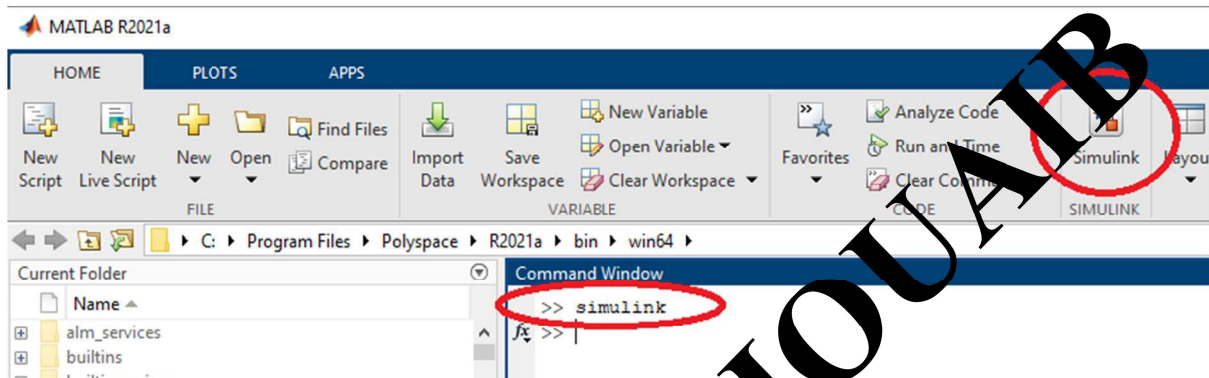
Simulink is a graphical extension to MATLAB for modelling and simulation of systems. In Simulink, systems are drawn on screen as block diagrams. Many elements of block diagrams are available, such as transfer functions, summing junctions, etc., as well as virtual input and output devices such as function generators and oscilloscopes. These virtual devices will allow students to perform simulations of the models they will build. Simulink is integrated with MATLAB, and data can be easily transferred between the programs. In this practical work, we will apply Simulink to the examples of different blocks, then simulate the systems.

Starting Simulink

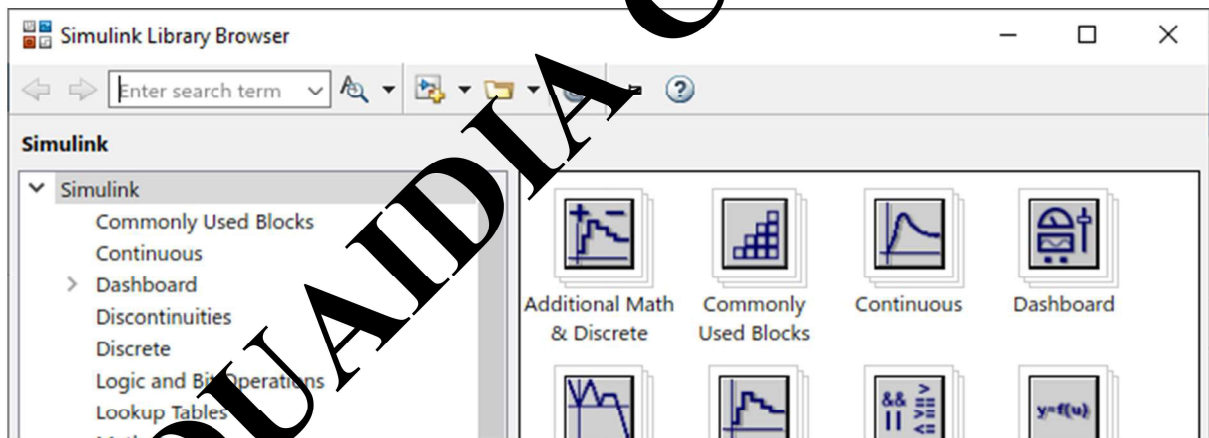
Simulink is started from the MATLAB command prompt by entering the following command:

```
>> simulink
```

- ❖ Alternatively, students can hit the **Simulink** button at the top of the MATLAB window, as shown here:



Then the following window appears (Simulink Library Browser):

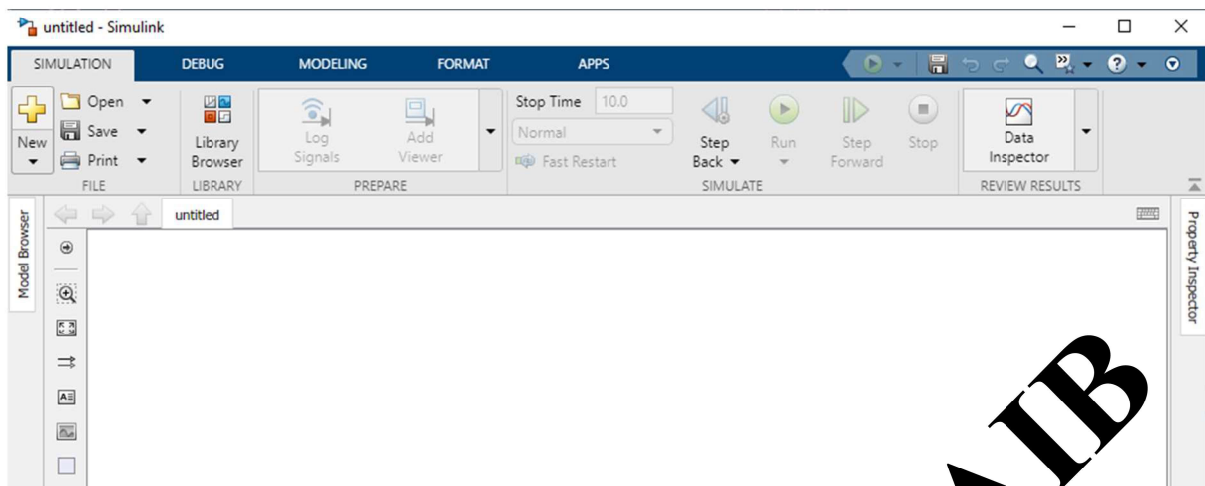


The Simulink Library Browser is the library where the student finds all the blocks that the student may use in

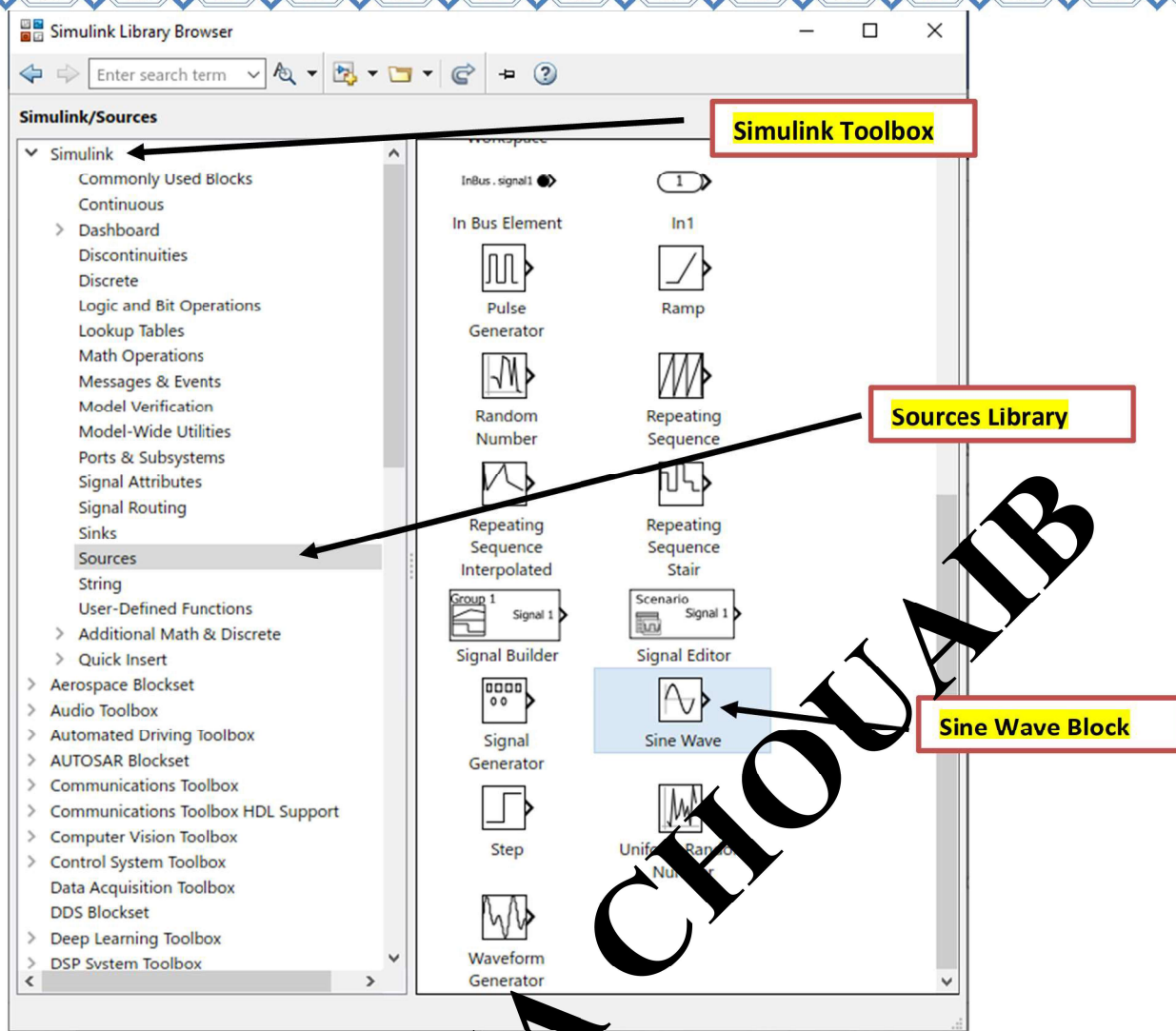
Simulink. Simulink software includes an extensive library of functions commonly used in modelling a system. These include:

- Continuous and discrete dynamics blocks, such as Integration, Transfer functions, etc.
- Math blocks, such as Sum, Product, Add, etc.
- Sources, such as Ramp, Random Generator, Step, etc.
- Sinks to display signals.

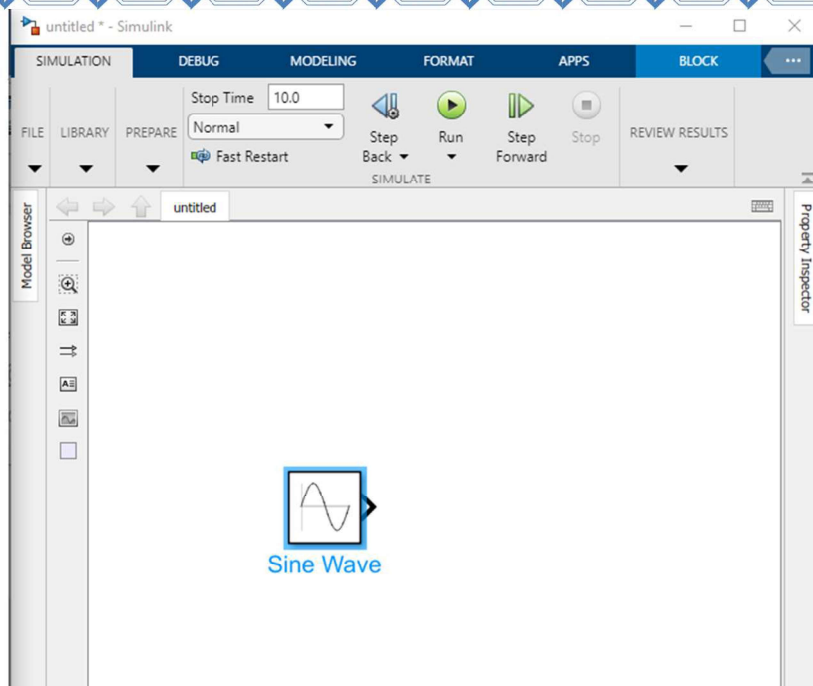
- ❖ Click on Blank Model or **CTRL** + **N**, and a new window will appear as shown below.



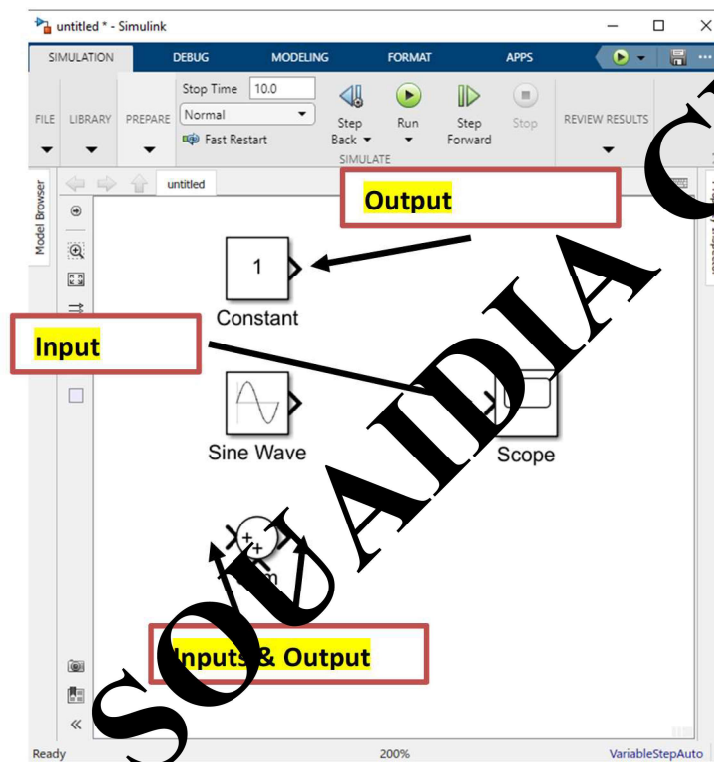
The student may now drag the blocks he wants to use from the Simulink Library Browser to the model surface (or right-click on a block and select "Add ...").



- ❖ Drag and drop the block in the Simulink Window.



Each block has a specific function and also has at least an input/output or both.



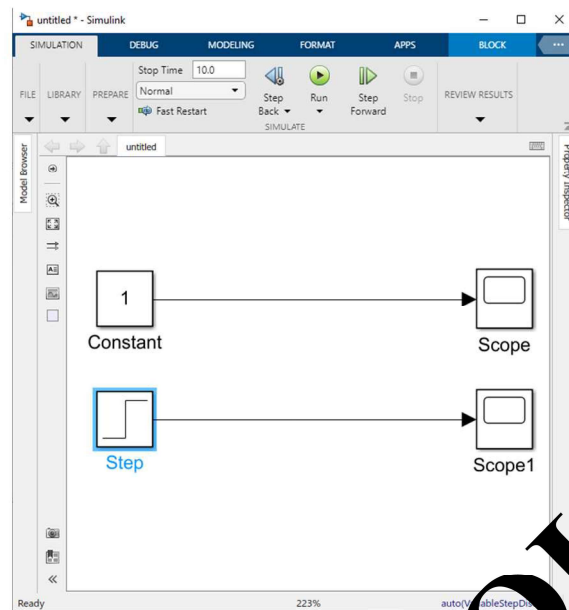
Task to do:

Drag and drop each one of these blocks to the model window.

Simulink → Sources → Constant block.

Simulink → Sources → Step block.

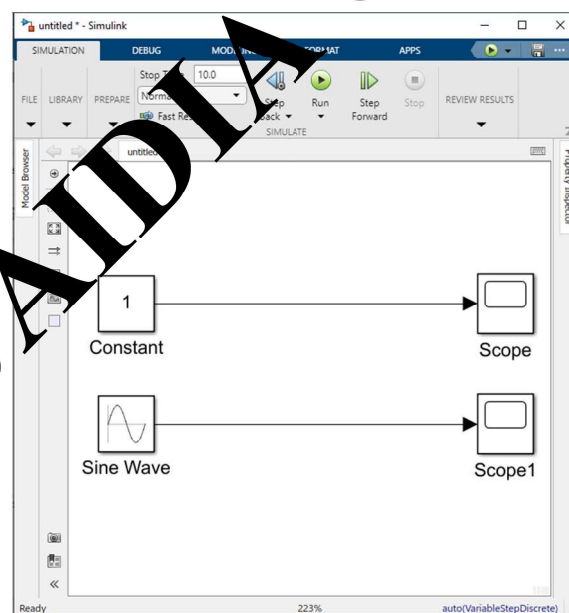
Simulink → Sources → Scope.



Simulink → Sources → Constant block.

Simulink → Sources → Sine Wave block.

Simulink → Sources → Scope.

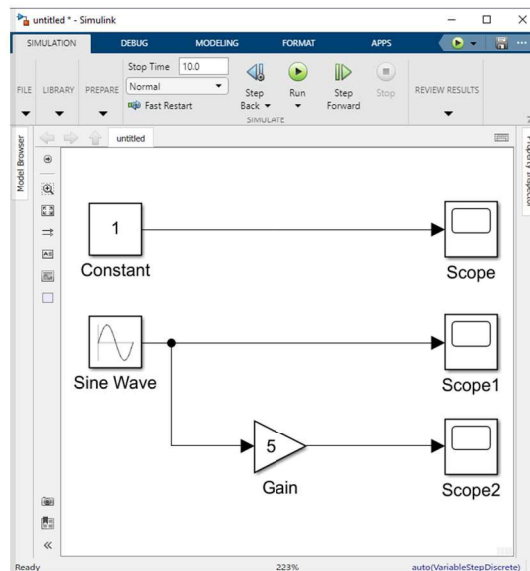


Simulink → Sources → Constant block.

Simulink → Sources → Sine Wave block.

Simulink → Sinks → Scope.

Simulink → Math Operations → Gain.



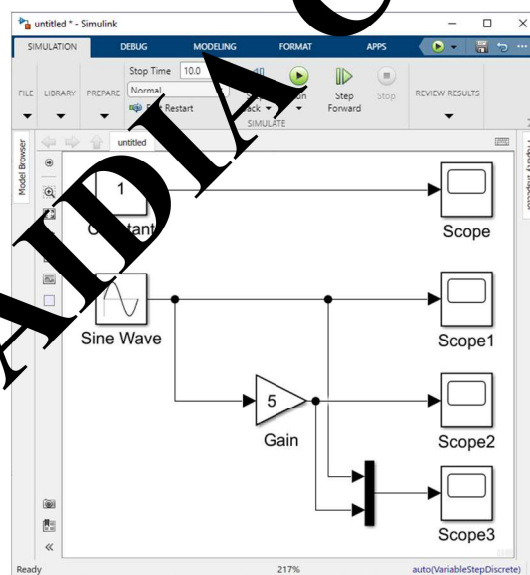
Simulink → Sources → Constant block.

Simulink → Sources → Sine Wave block.

Simulink → Sinks → Scope.

Simulink → Math Operations → Gain.

Simulink → Signal Routing → Mux



Simulate each one by clicking on this



and displaying the results or signals.