

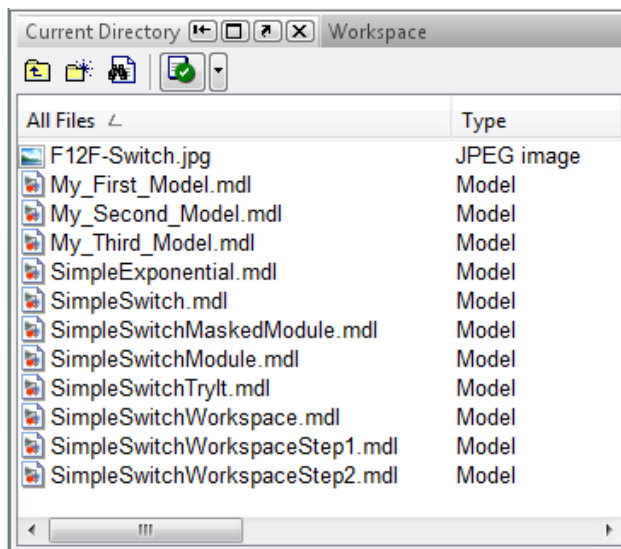
EE202 Lab#9 Interactive Simulink Tutorial

Essential skills for modeling dynamical systems in Simulink

Follow along with this interactive tutorial on Simulink. After watching each interactive tutorial section, please do the example in Simulink. Along the way take snap-shots of your work as shown below. I use the snipping tool which comes with Windows 7 – Accessories / Snipping Tool) of your work. Please **do not** take snap-shots of the tutorial itself or these instructions. To save time, some of tutorials are included in a folder you can download as part of the tutorial.

http://www.mathworks.com/academia/student_center/tutorials/slregister.html

Before you begin, create a new folder in your Matlab Current Directory named “Simulink Tutorial.” By the end of the lab your folder should contain the following models and a custom jpg image.



Simulink On-Ramp (approximately 45 minutes)

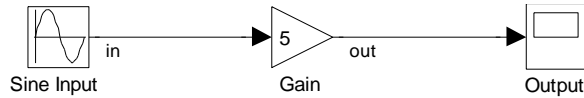
Learn the basics of graphical modeling with Simulink.

- Simulink On-Ramp Tutorial [4:42]
 - What Is Simulink?
 - Simulink Tutorial Introduction
- Constructing and Running a Simple Model [13:45]

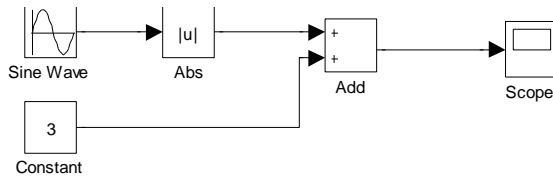
As mentioned in the introduction, after you run through the interactive step-by-step instructions in the tutorial itself you need to recreate the models in Simulink. Please name your files as indicated.

- Q&A – Starting Simulink
 - On Q&A you need to use capital letters (i.e., A, B, C, D)
- Try It – Launching Simulink
 - Find the Add block means find the Math Operator’s Add Block

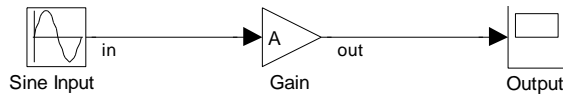
- Creating a New Model
 - Include the title of this section and a snap-shot of your first model as **Lab Question 1**.
 - Save your model with the name **My_First_Model**. Click on “Saving a Model” at the end of this section.
 - Ignore Warnings (2) and double-click Output block to see waveform.



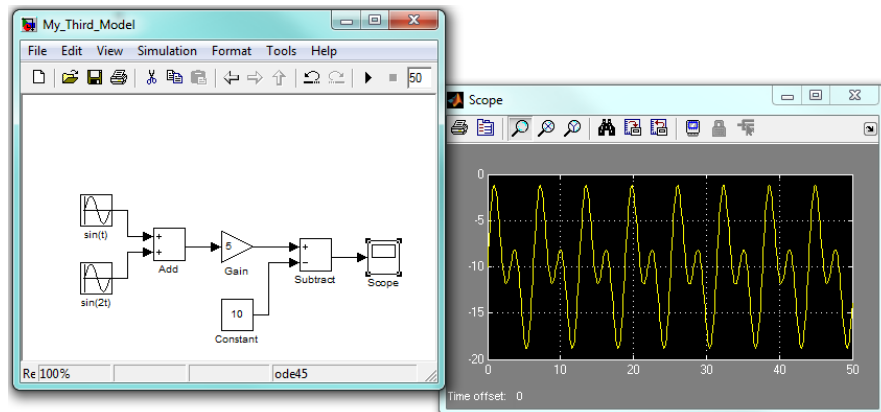
- Try It – Building a Model and Running a Simulink – My Second Model
 - Include the title of this section and a snap-shot of your second model as **Lab Question 2**.
 - Save your model with the name **My_Second_Model**.



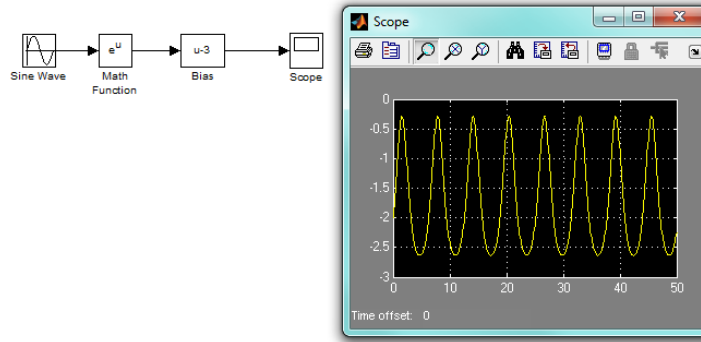
- Defining Simulink Parameters with Matlab. *You do not need to turn in this modification of your second model.*



- Saving a Model
- Summary
- Simulating a Model [10:10]
 - Changing the Step Size
 - Include the title of this section and a snap-shot of your Simulink model with scope output as **Lab Question 3**.
 - Save your model with the name **My_Third_Model**.
 - Create the Simulink model for 50 seconds and set maximum step size to 0.1 seconds. Do not forget the binoculars. Copy and paste your Simulink model and output to your lab report. Do **not** simply copy and paste from the tutorial.



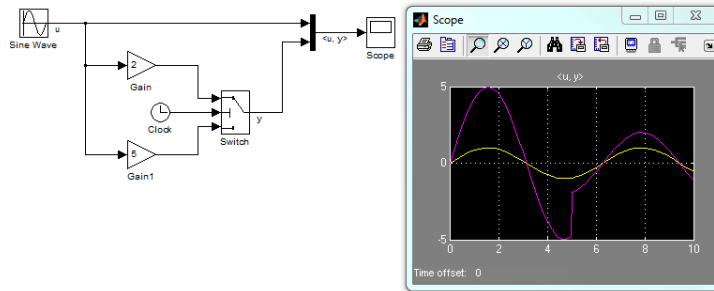
- Try It – Changing the Stop Time and Max Step Size.
 - Include the title of this section and a snap-shot of your Simulink model with scope output as **Lab Question 4**.
 - Save your model with the name **SimpleExponential**.
 - Again copy and paste your Simulink model and output to your lab report. Do **not** simply copy and paste from the tutorial.



- Working with MATLAB [9:12]

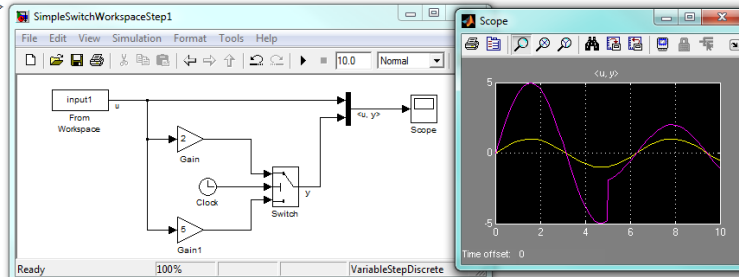
As mentioned in the introduction, to save time you can find many of these Simulink models in the tutorial folder

- Constructing a Logical Equation
 - Include the title of this section and a snap-shot of your Simulink model with scope output as **Lab Question 5**.
 - Save your model with the name **SimpleSwitchWorkspaceStep1**.



- Using Inputs from Matlab. *You do not need to turn in this modification of your logical equation.*
 - Save your model with the name **SimpleSwitchWorkspaceStep2**.

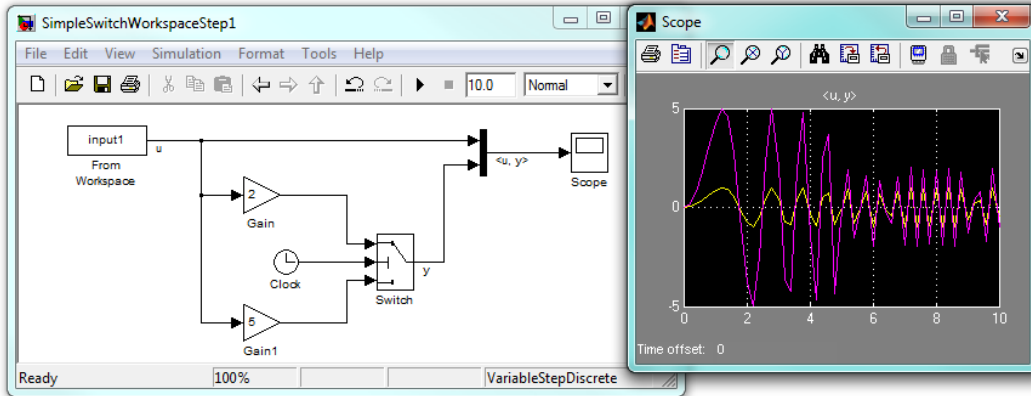
```
>> time = (0:0.01:10)';
>> signal1 = sin(time);
>> input1 = [time,signal1];
>>
```



○ Initializing Inputs

- Include the title of this section and a snap-shot of your Simulink model with scope output as **Lab Question 6**.
- You are still using the **SimpleSwitchWorkspaceStep2** model.

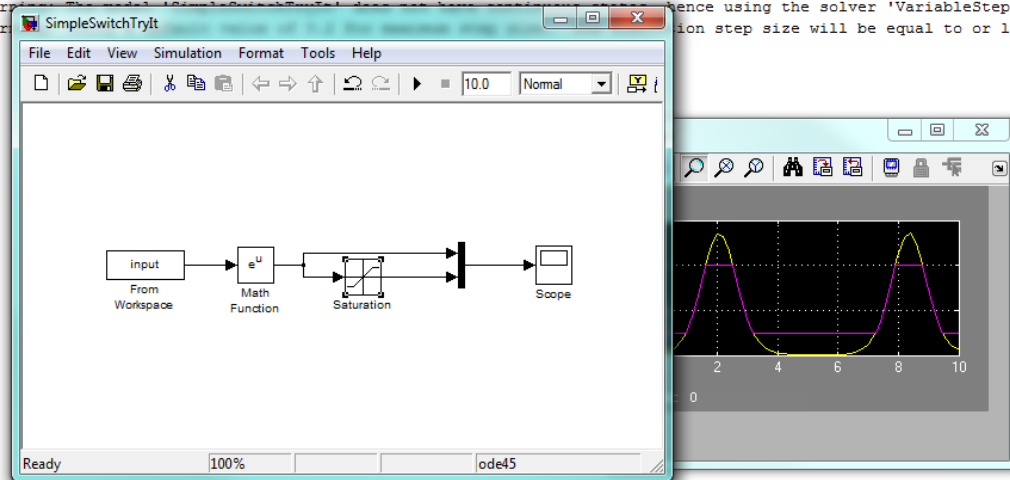
```
>> t = (0:0.1:10)';
>> u = sin(t.^2);
>> input1 = [t,u];
>>
```



○ Try It – Complete the Following Model

- Include the title of this section and a snap-shot of your Simulink model with scope output as **Lab Question 7**.
- Save your model with the name **SimpleSwitchTryIt**.

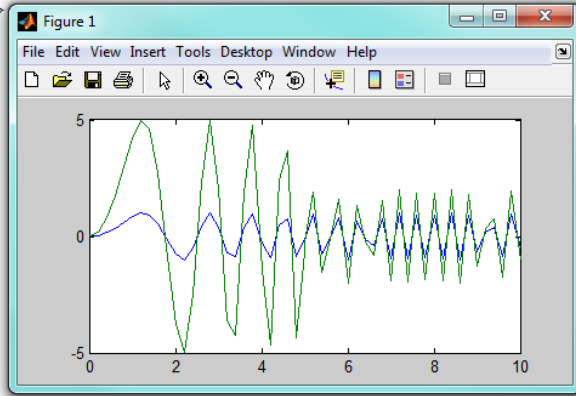
```
>> t = (0:0.01:10)';
>> u = 3*sin(t-0.5)-2;
>> input = [t u];
Warning: The model 'SimpleSwitchTryIt' does not have continuous states, hence using the solver 'VariableStepDiscr
Warning: Using a default value of 0.2 for maximum step size. The simulation step size will be equal to or less t
Warning: The model 'SimpleSwitchTryIt' does not have continuous states, hence using the solver 'VariableStepDiscr
Warning: Using a default value of 0.2 for maximum step size. The simulation step size will be equal to or less t
>>
```



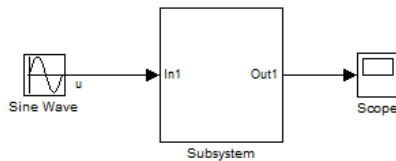
○ Sending Outputs

- Include the title of this section and a snap-shot of your Matlab code with plot scope output as **Lab Question 8**.
- Save your model with the name **SimpleSwitchWorkspace**.

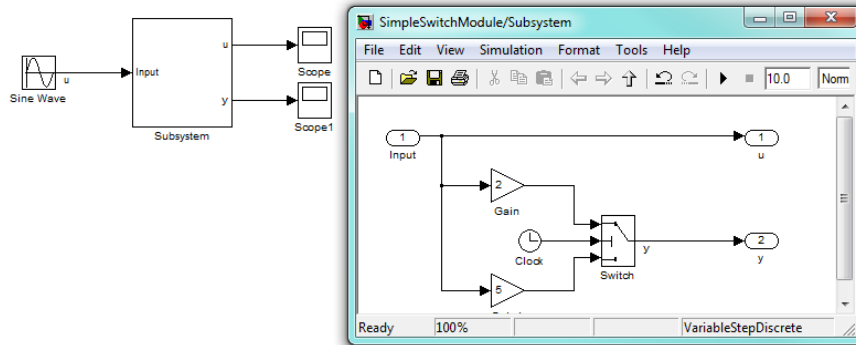
```
>> t = (0:0.1:10)';
>> u = sin(t.^2);
>> input1 = [t,u];
>> plot(tout,output)
>>
```



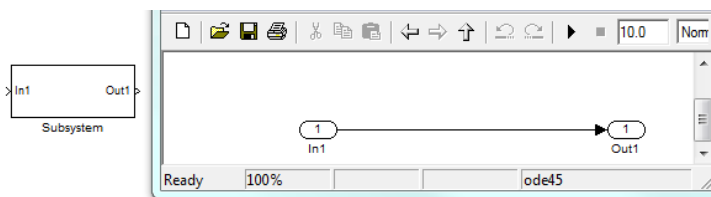
- Creating Subsystems [6:46]
 - Creating Subsystems. *Although you need to complete the following sections, and build the Simulink module, you do not need to turn in this figure.*
 - Save your model with the name **SimpleSwitch**.



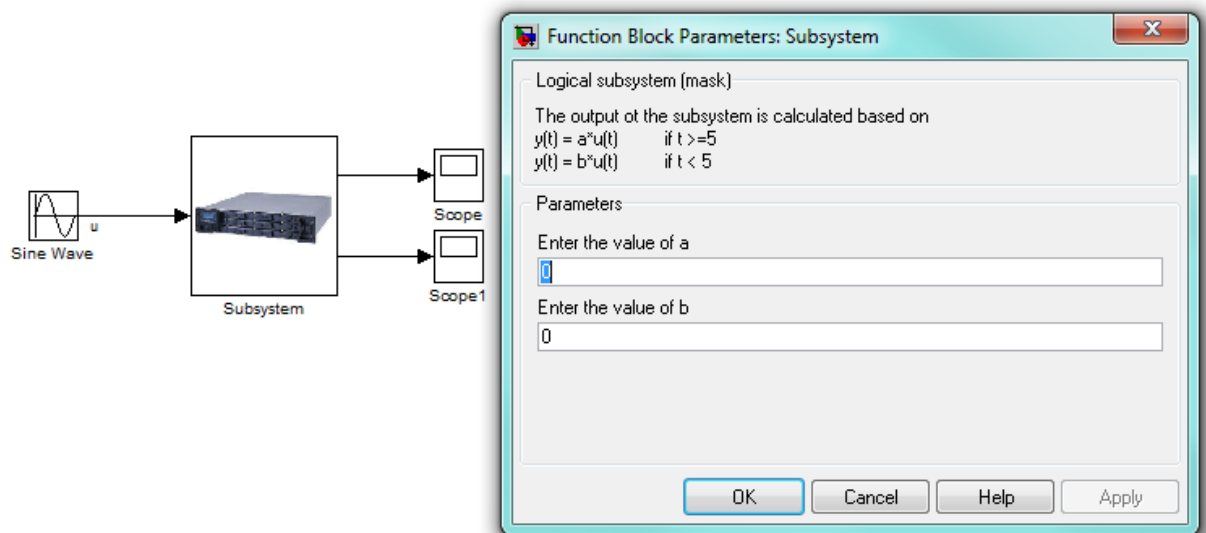
- Subsystems Inputs and Outputs
 - Include the title of this section and a snap-shot of your Simulink model with the subsystem module as **Lab Question 9**.
 - Save your model with the name **SimpleSwitchModule**.



- Using the Subsystem Block. *Although you should complete the following sections, you do not need to save the model or turn in this figure.*



- Q&A – Creating a Subsystem
- Masked Subsystem
- Creating a Masked Subsystem
 - Include the title of this section and a snap-shot of your Simulink model with the Function Block Parameter data entry window as [Lab Question 10](#).
 - Save your model with the name **SimpleSwitchMaskModule**.
 - Add your own custom artwork. Do not use one of the two that come with the tutorial. The image must be placed in the Current Directory.
 - To see the unmasked Simulink model, select Edit > Look Under Mask
 - You can find out more about masked blocks here:
<http://blogs.mathworks.com/seth/2008/07/27/how-to-make-your-own-simulink-block/>



As part of the sign-off process I will be looking at your Simulink Workspace.

