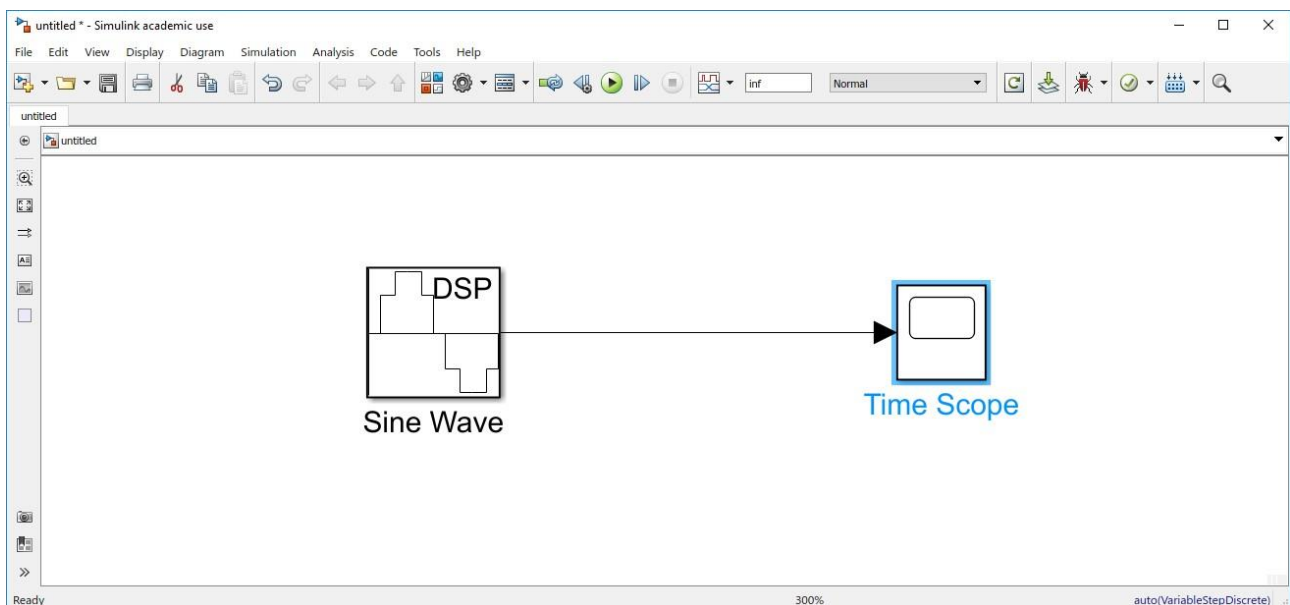


Digital filtering with Matlab and Simulink

Open Matlab. Start Simulink Interface.

FIRST PART: Using simulink as signal generator. Generate a sinusoid, to be observed on the oscilloscope.

- Open Simulink;
- Select Blank_model;
- Open the library;
- Insert the block needed and create the model, according to the below figure;



- Set the Sine Wave parameters as follows:
 1. Amplitude = 1 V
 2. Frequency = 1e3 Hz
 3. Phase offset = 0;
 4. Simple mode = Discrete;
 5. Output complexity = Real;
 6. Computation method = Trigonometric fnc;
 7. Sample Time = 1/44100 s
 8. Sample per frame = 1024;

Compare the plot with that obtained in the previous experience.

THIRD PART: Simulate an RC filter

- Modify the FilterDesign parameters in order to obtain the characteristic function of the RC implemented in the last experience;
- Go back to the previous experience (RC filter). Observe the attenuation corresponding to different frequencies through the oscilloscope (FFT option). Consider all frequencies attenuated less than A_{pass} as “bandpass”. Consider all frequencies attenuated more than A_{stop} as “stopband”. Identify F_{pass} and F_{stop} accordingly (obviously, the cut off frequency is always between them);
- Re-design the low pass digital filter via FilerDesign to fit the values obtained by the measurements at the previous point;
- Verify the characteristic function of the filter obtained via spectrum analyzer and time scope.

FOURTH PART: Improve the digitar FIR filter characteristic function with a constrained number of coefficients. E.g., set the number of coefficietns to 200.

Re-generate the filter accordingly. Then, add the new filter to the model and compare it to the previous one in the terms of characteristic function.

