

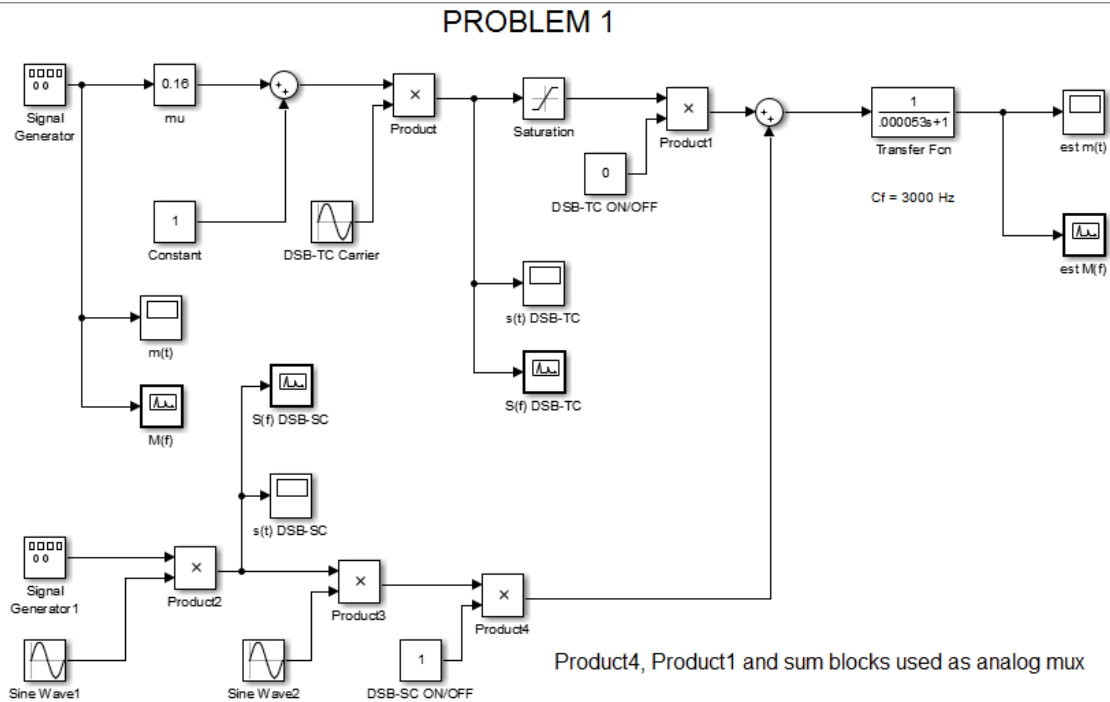
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ECE 44800

Project II

Problem 1:

Block Diagram



Signal Generator block generates m_1 and m_2 . $F = 1000$ Hz, $A_m = 5$ v.

Mu should read K_a . K_a is 0.16 for 80% modulation.

Both are added to a constant 1 and multiplied by DSB-TC carrier, which is $f = 3000$ Hz, $A_c = 17.7$ V for 38 W power on a 1 ohm basis.

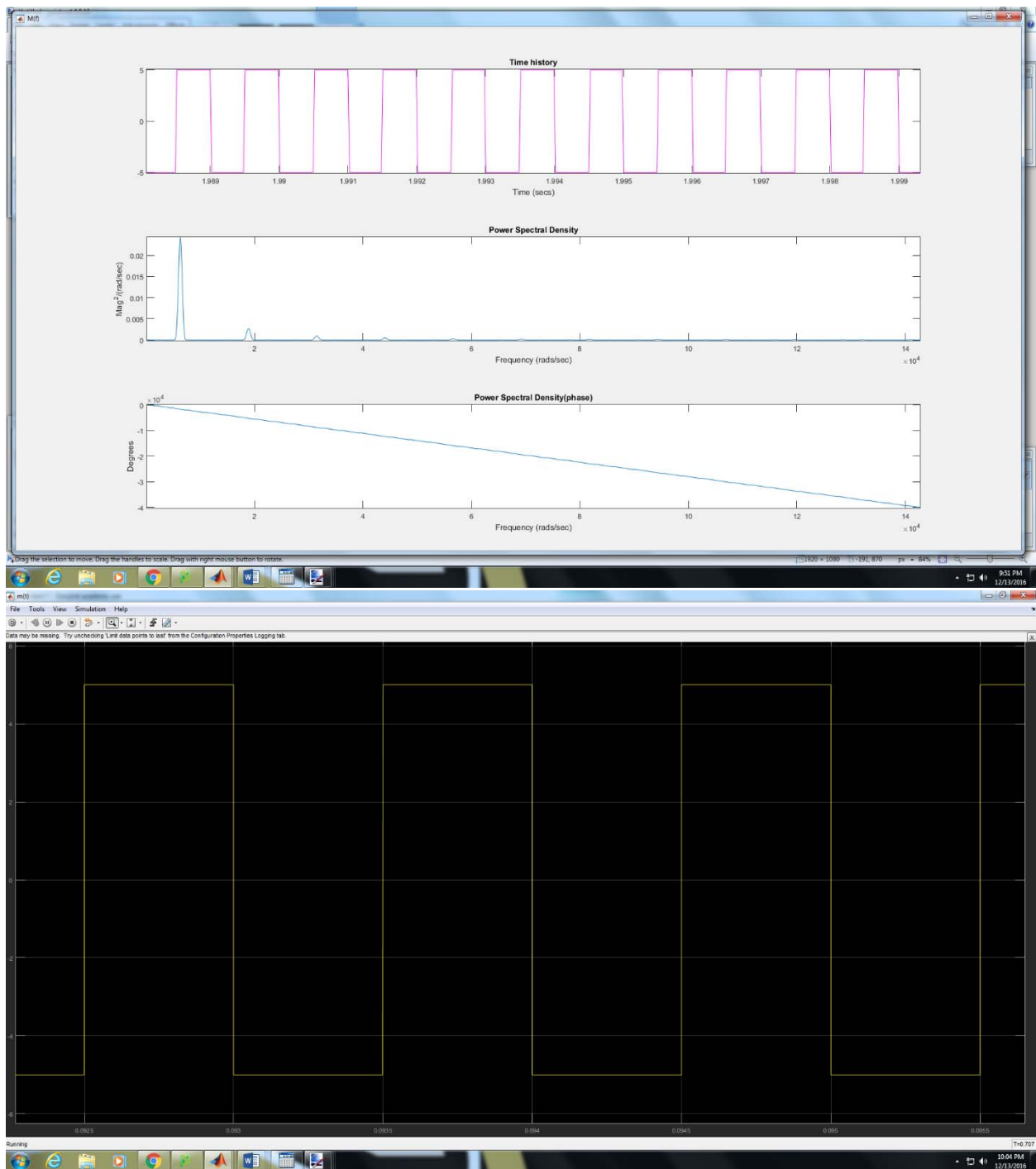
Saturation block is from 0 to 10, and demodulates the DSB-TC signal.

Product 1, DSB-TC ON/OFF, and Product 4, DSB-SC ON/OFF and the sum act as an analog mux to switch between schemes.

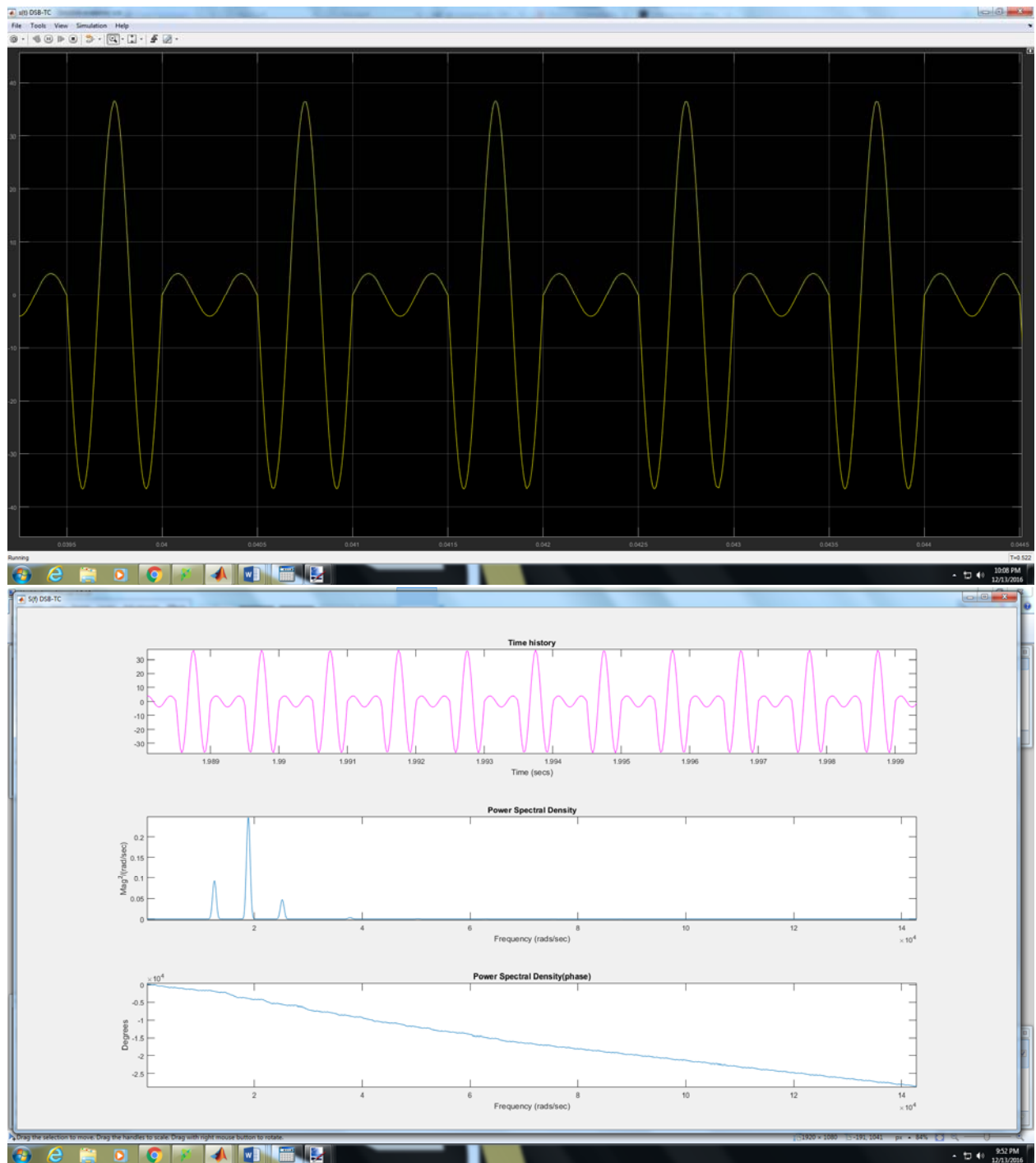
Transfer fcn is the low pass filter. Cutoff was chosen as 3000 Hz to not cut down too much on square wave harmonics.

SineWave1 is the carrier for the DSB-SC scheme, product2 modulates, product3 demodulates

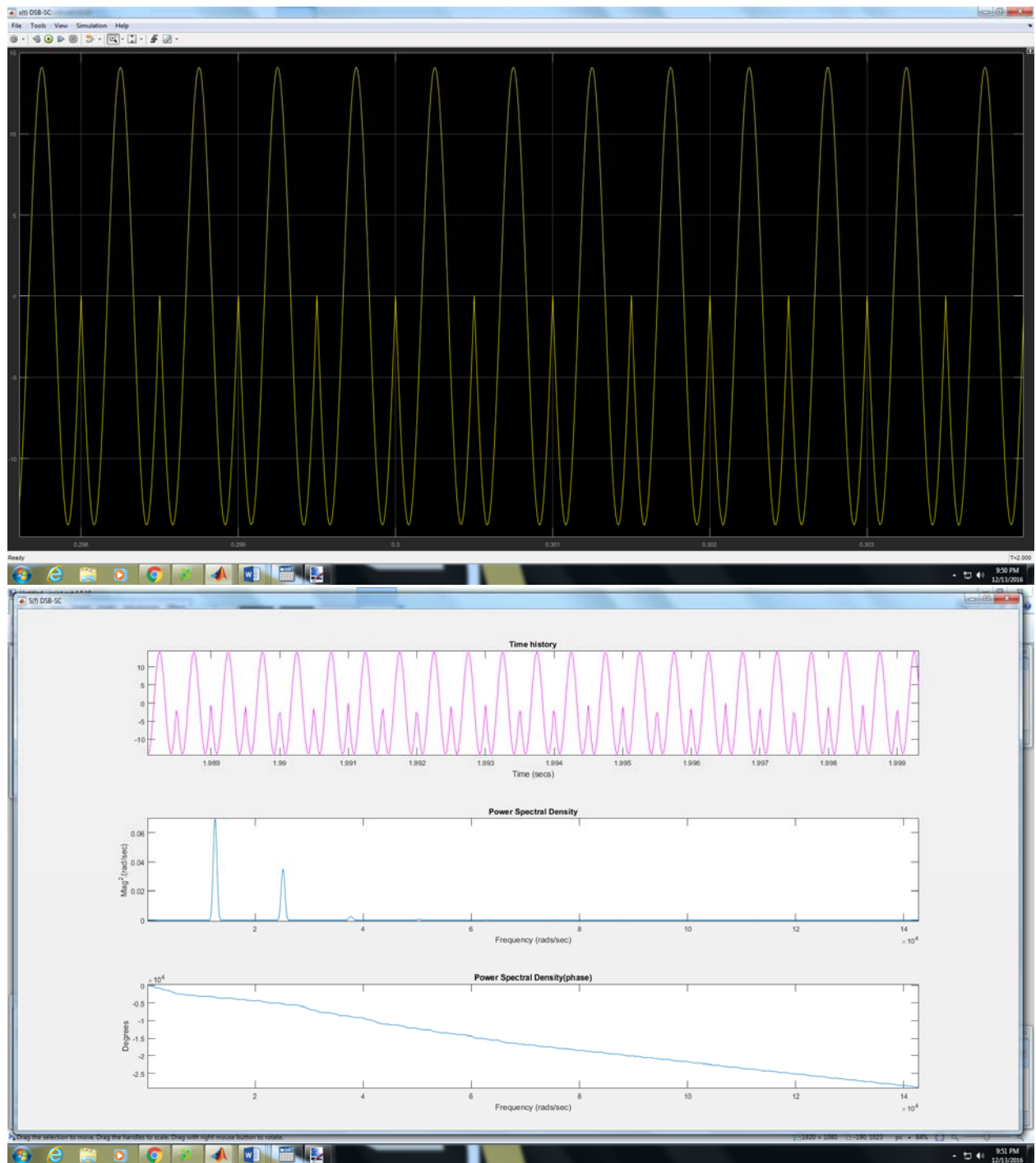
Message frequency and time domains



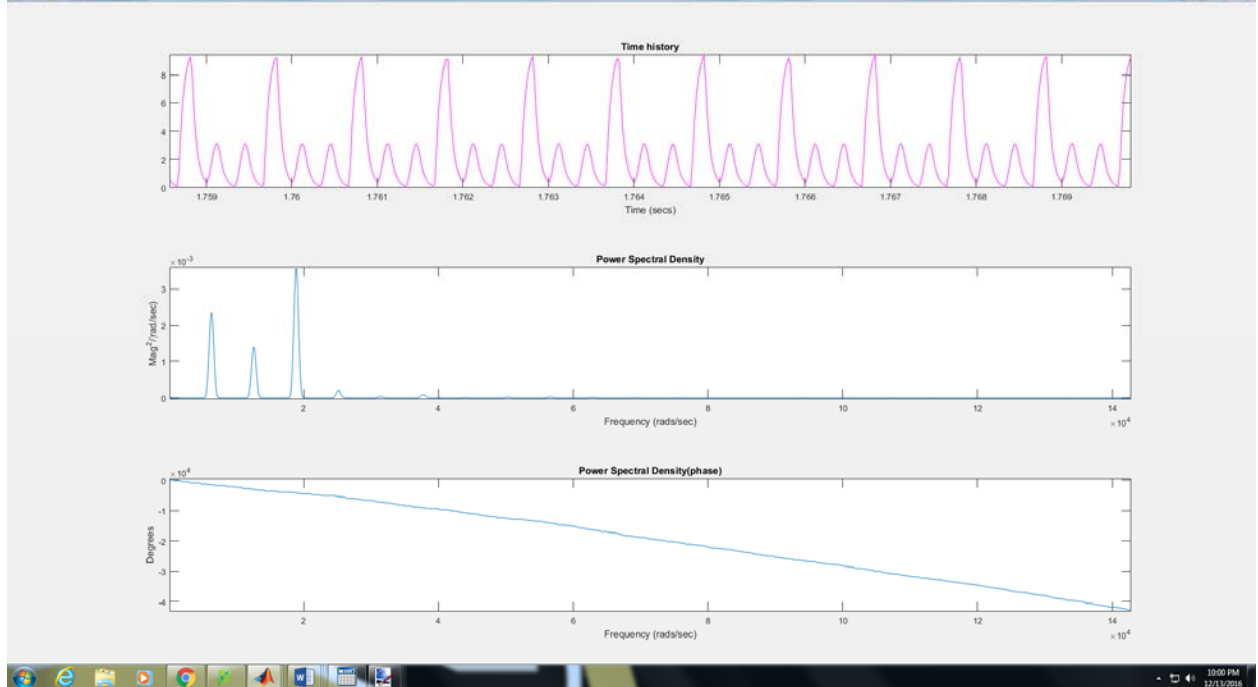
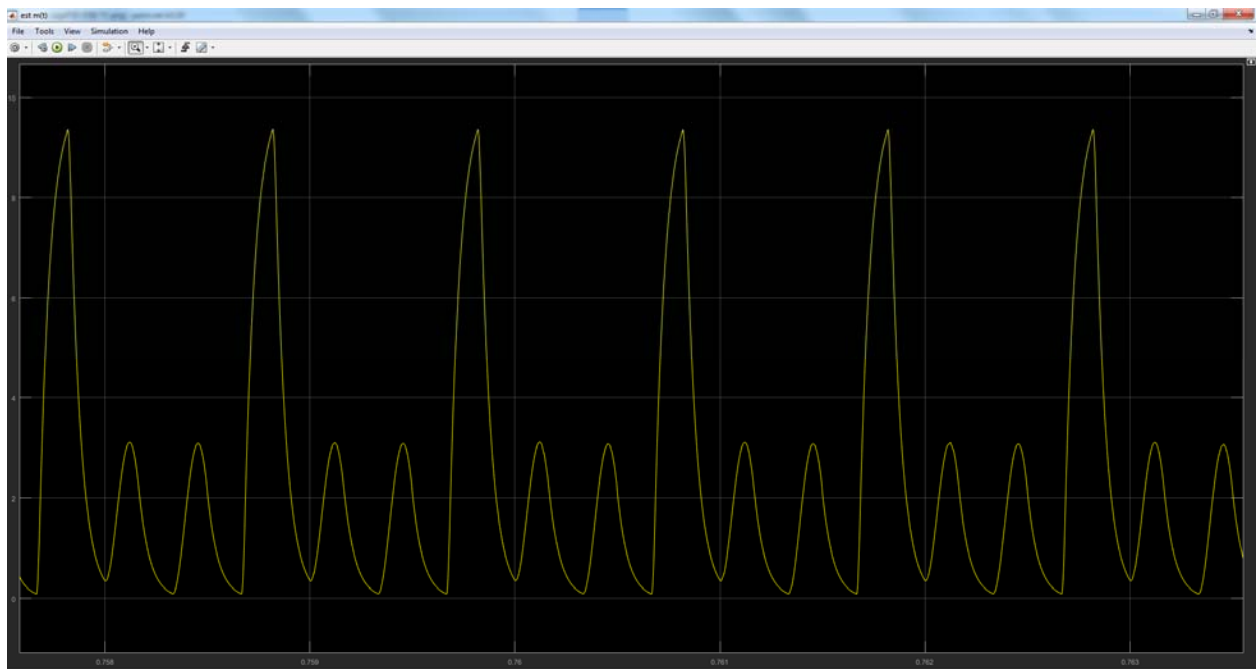
Modulated signal for DSB-TC frequency and time



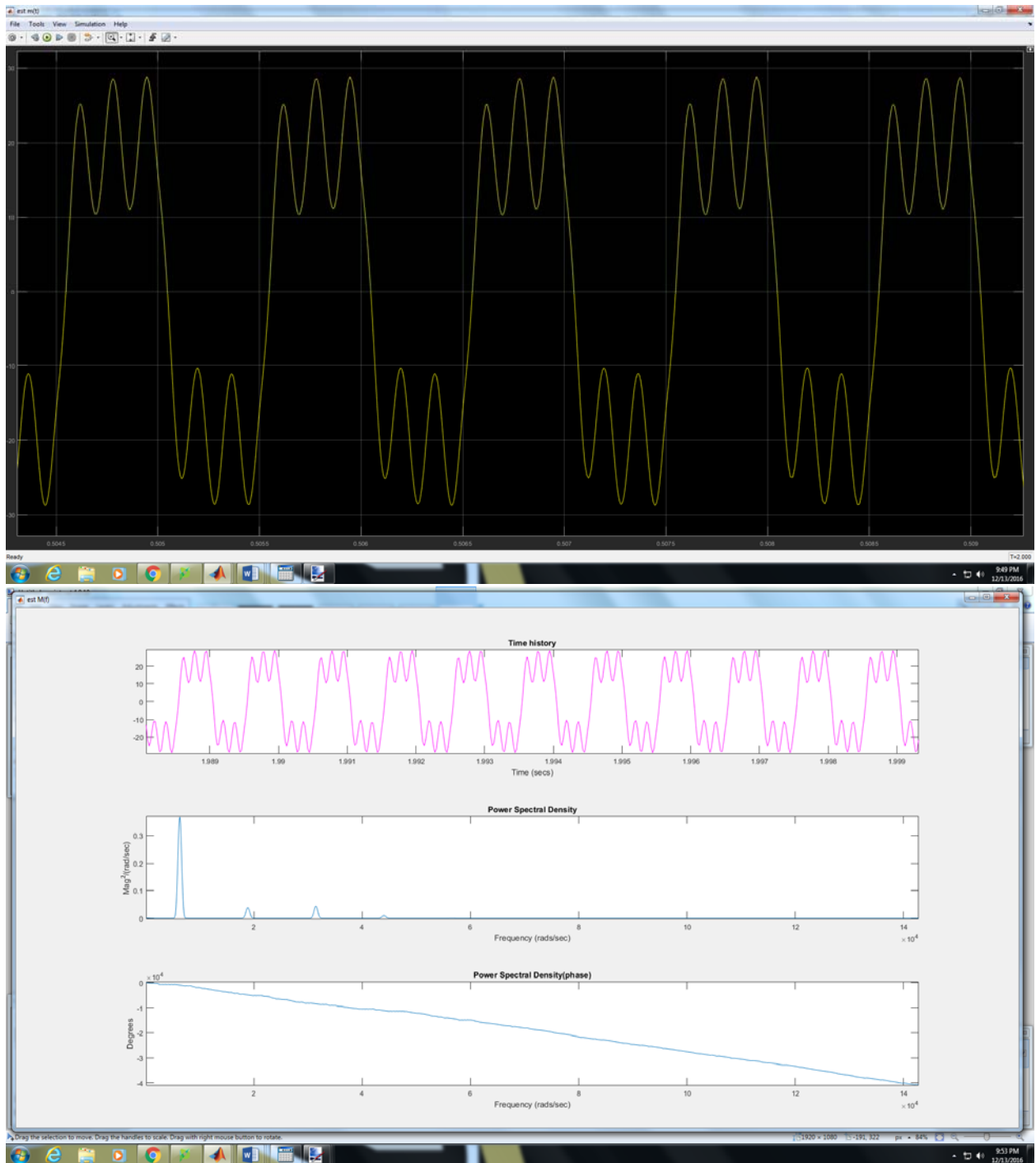
Modulated signal for DSB-SC freq and time



Estimated message for DSB-TC freq and time

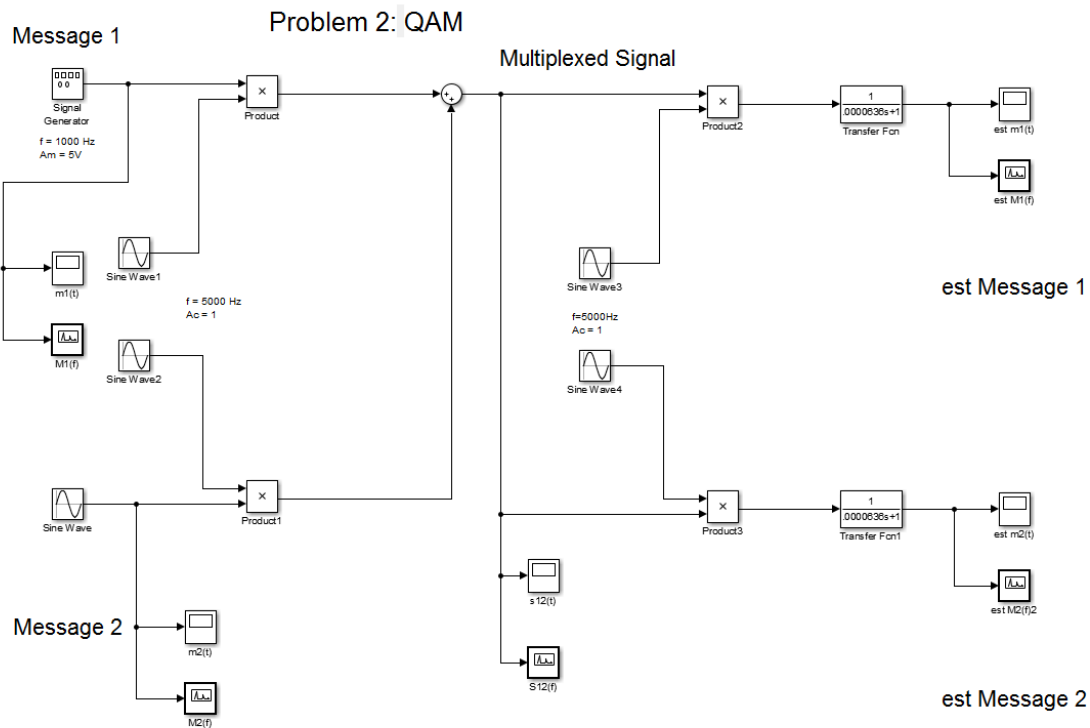


Estimated Message freq and time for DSB-SC



Problem 2

Block Diagram for QAM system



Signal generator generates message 1, 5v amplitude, 1000 Hz. This gets modulated with the product block and the SineWave1 Carrier signal which is $f = 5000 \text{ Hz}$, 1V amp.

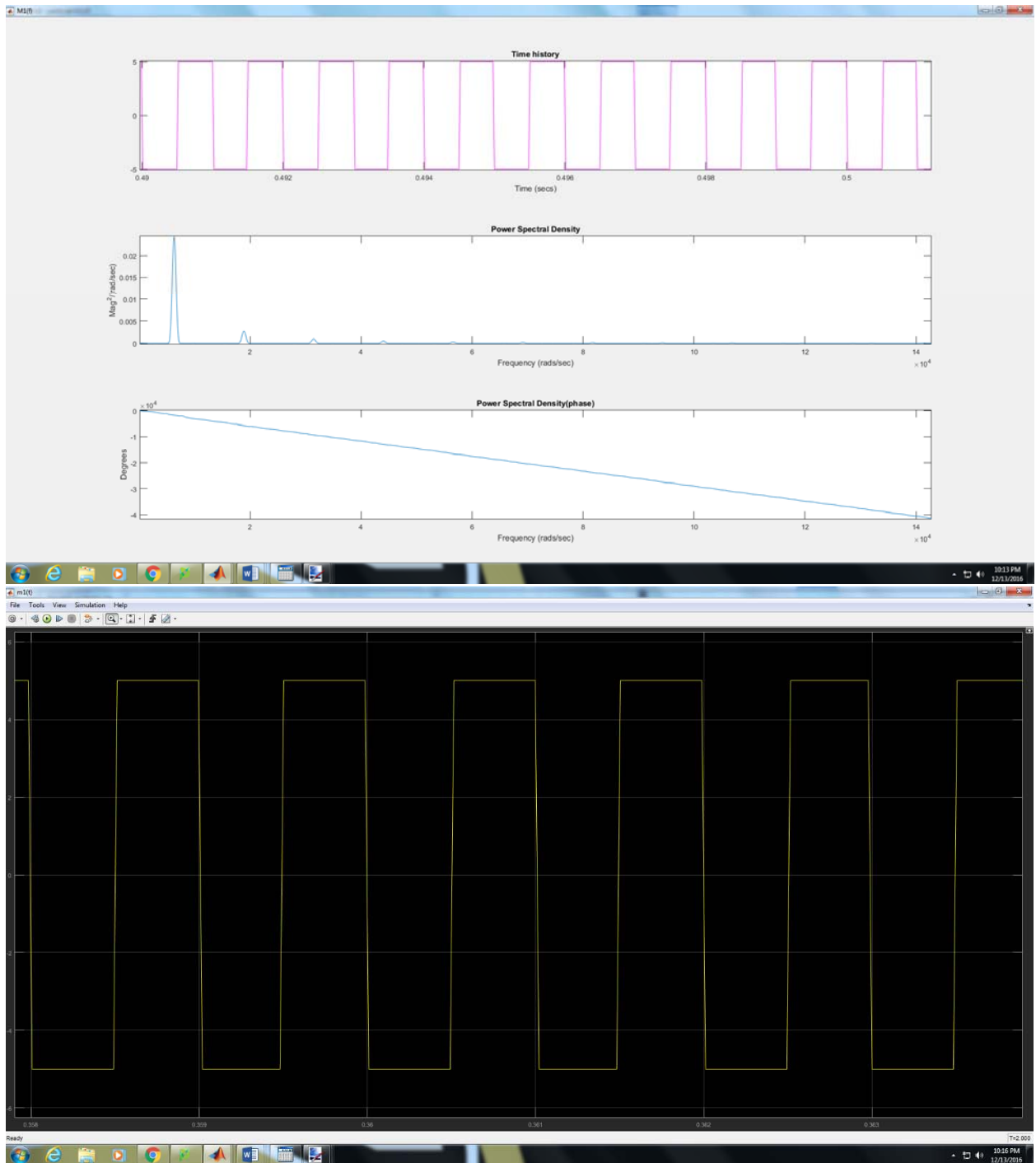
SineWave generates message 2, which is a 2v sine wave with a frequency of 1500 Hz. This is modulated with product1 and SineWave2, which is $f = 5000 \text{ Hz}$, 1V amp, phase 90 degrees.

These are summed into a multiplexed signal.

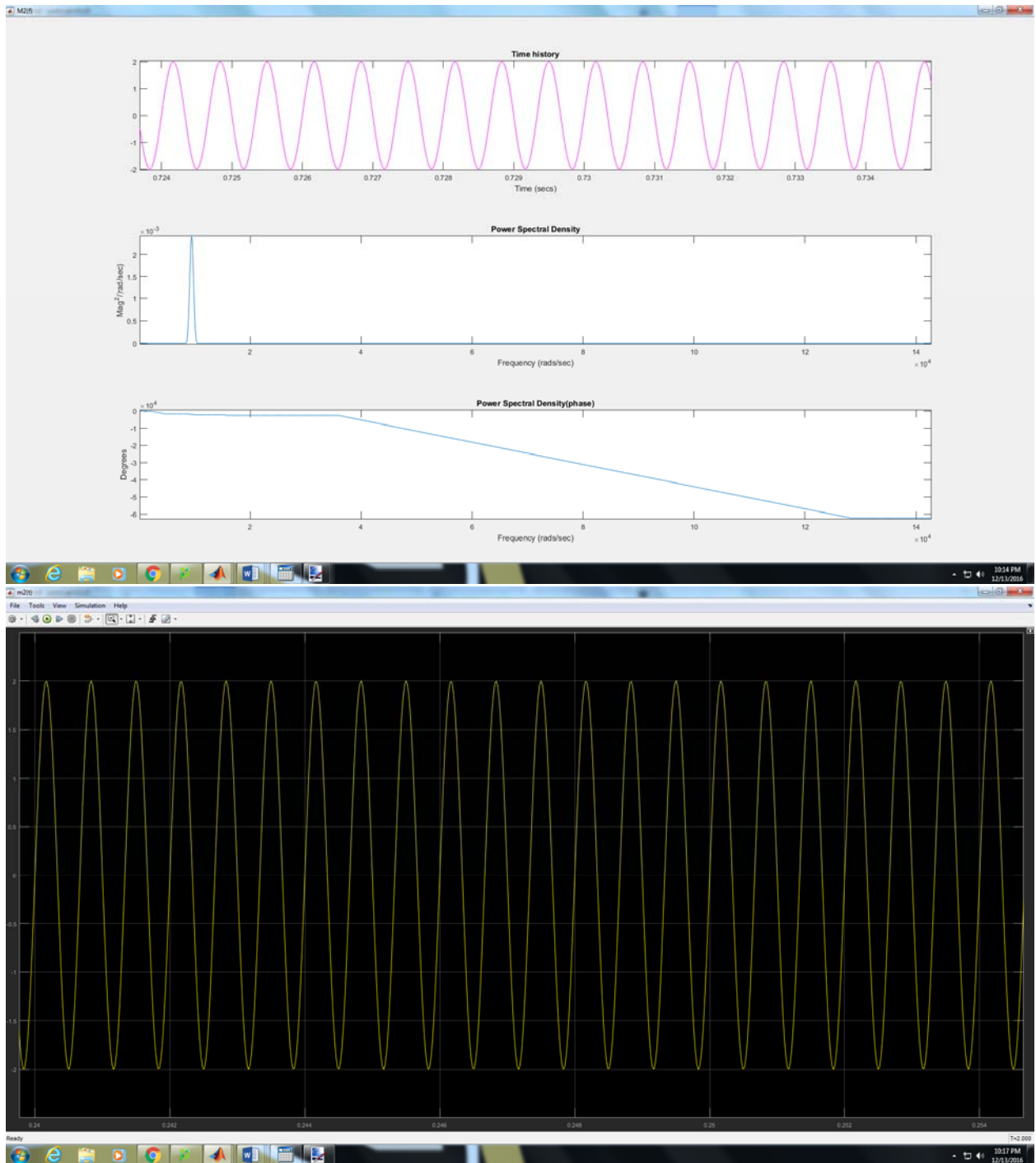
Sinewave3 and Product2 demodulate Message 1, while SineWave4 and Product3 demodulate Message2

Transfer FCN blocks are low pass filters, cutoff set to 2500 hz to strike a balance between getting rid of extraneous carrier artifacts and reproducing the M1 squarewave.

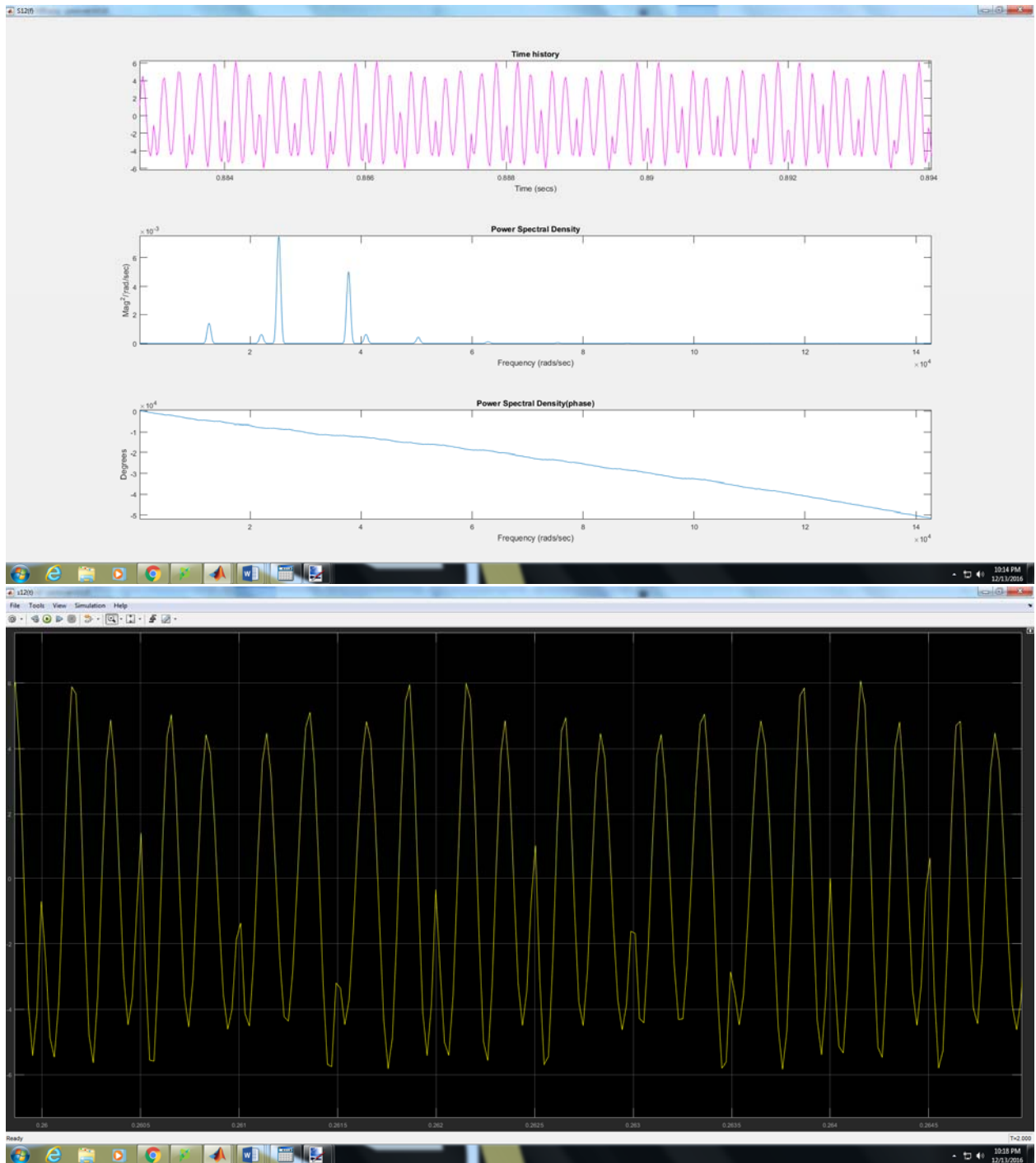
Message 1 freq and time



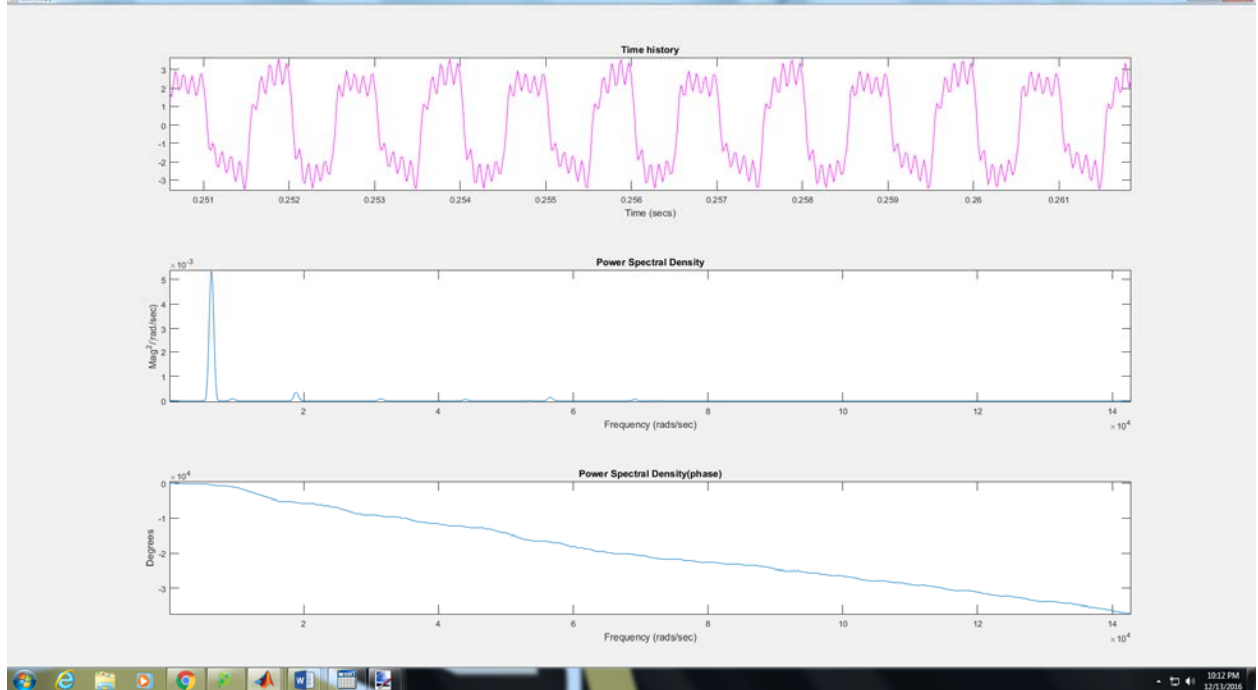
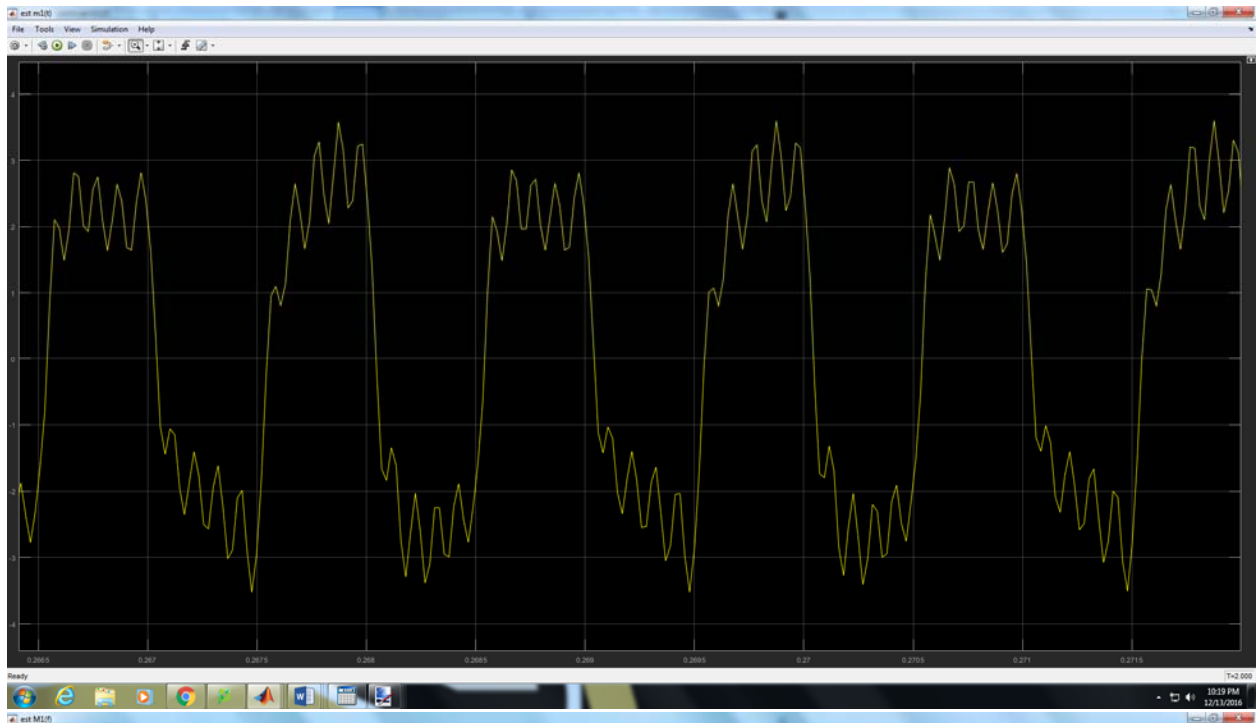
Message 2 freq and time



Multiplexed signal freq and time



Estimate Message 1 frequency and time



Estimate Message 2 Freq and time

