Name:

Score: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1: Lead Engineer (print):\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2: Lead Engineer (print):\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3: Lead Engineer (print):\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4: Lead Engineer (print):\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5: Lead Engineer (print):\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Prepare your solutions as additional pages of this MS Word document.

Problem:

(1) Compute the Laplace transform of *x(t)*. Convert the Laplace transform to a frequency response by substituting *s* = *j2πf*. Plot the magnitude of the Laplace transform as a function of frequency (*f* in Hz). Use linear scales for both axes. Explain whether this makes sense.

(2) Suppose this signal is applied to the linear system shown, which is characterized by *h(t)*. Compute the Laplace transform of the transfer function and the output, *y(t)*. Plot the magnitude of these functions as a function of frequency using the same linear scales in (1). Explain whether your results make sense. Compute the inverse Laplace transform to get the output signal, *y(t)*.

(3) Next, assume the signal in (1) is applied to the circuit shown. Design the circuit, which is a low-pass filter, to have a cutoff frequency of 2 Hz.

(4) Compute the Laplace transfer function of the circuit and the output. Plot the magnitude responses. Justify your results using what you learned from (1) and (2).

(5) Plot the time domain waveform, *y(t)*, and verify these in Multisim. Justify your results.





