ENGINEERING PHYSICS 3W4

DAY CLASS   Dr. Wm. Garland

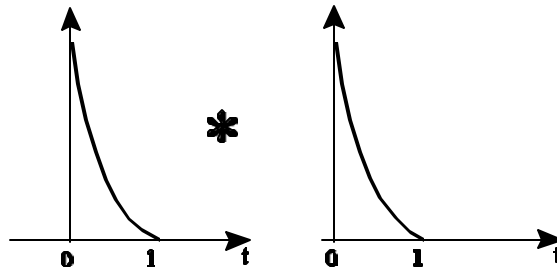DURATION: 30 minutes

McMASTER UNIVERSITY   QUIZ #2   March 30, 2000

Special Instructions: Closed Book. All calculators and up to 3 double sided 8 ½" by 11" crib sheets are permitted.

THIS EXAMINATION PAPER INCLUDES 1 PAGE AND 4 QUESTIONS.

1.   [5 marks] Evaluate the following expression:

$$\int_{-4}^{4} (-2t-1)\cos(B \cdot t)\, dt$$

2.   [15 marks] Graphically compute the convolution of the following function pair:

3.   [20 marks] Give brief answers to the following:

   a.   If the Autocorrelation of a signal is a delta function, what can you say about the signal?

   b.   Using a differential equation of your choice, illustrate how the Fourier Transform can be used to help solve the differential equation.

4.   [30 marks]

   a.   What does the ideal low-pass filter look like in frequency space?

   b.   What does the ideal low-pass filter look like in time space?

   c.   Given a general signal, show what happens to it in time space as it is passed through a low-pass filter. Clearly show the difference between the original signal and the filtered signal.

   d.   Given a general signal, show what happens to it in frequency space as it is passed through a low-pass filter.   Clearly show the difference between the original signal and the filtered signal.