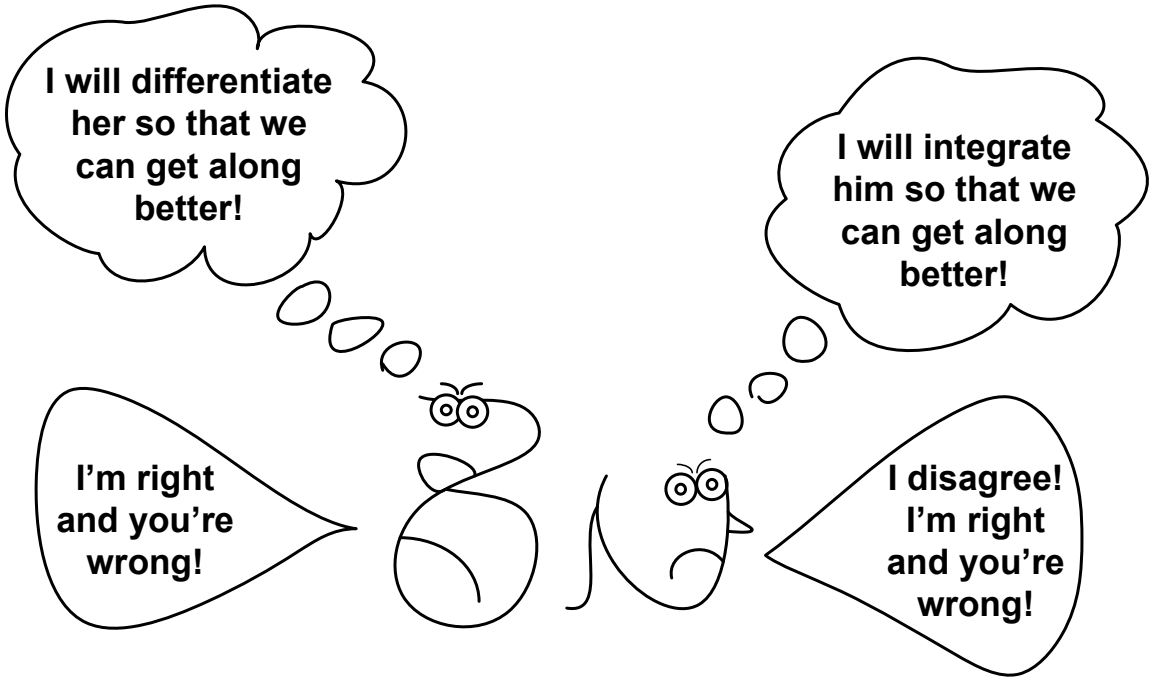


University of Portland
School of Engineering

EE 262-δignals & δystems-3 cr. hrs.
Spring 2006

Midterm Exam # 1

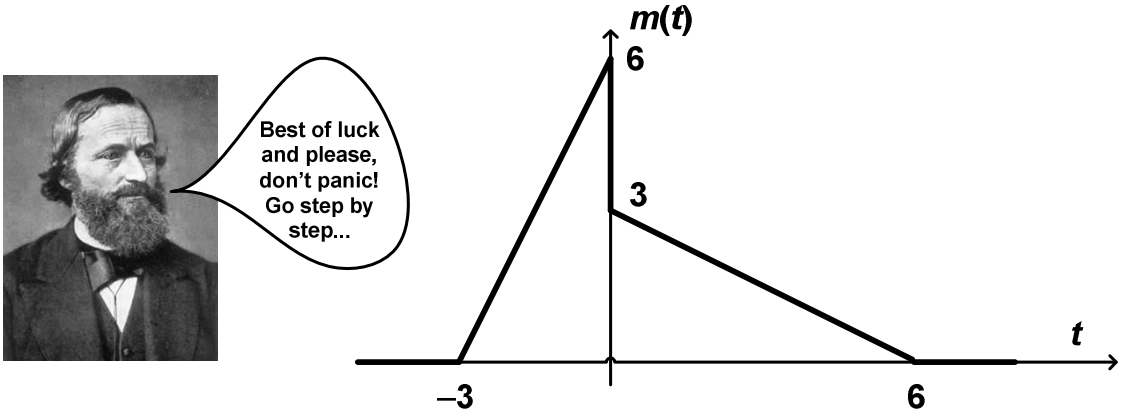
(Prepared by Professor A. S. Inan)

(Monday, February 27, 2006)
(Closed Book Exam, One formula sheet is allowed.)
(Total Time: 55 mins.)

Name:_____☺

Signature:_____☺

(1) (10 mins., Total: 30 points) **A continuous-time signal.** Consider the continuous-time signal denoted by $m(t)$ as shown in the figure below.



(a) (10 points) Sketch the even and odd parts of $m(t)$. Provide all the pertinent values on your sketch.

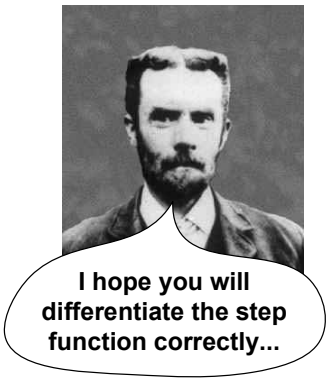
(b) (10 points) Sketch $m(2t+3)$.

(c) (10 points) Find the function $p(t)=dm(t)/dt$ and sketch $p(t)$ versus t. Provide all the pertinent values on your sketch.

(2) (15 mins., Total: 25 points) **Impulse, step, and ramp functions.** A continuous-time signal is given by

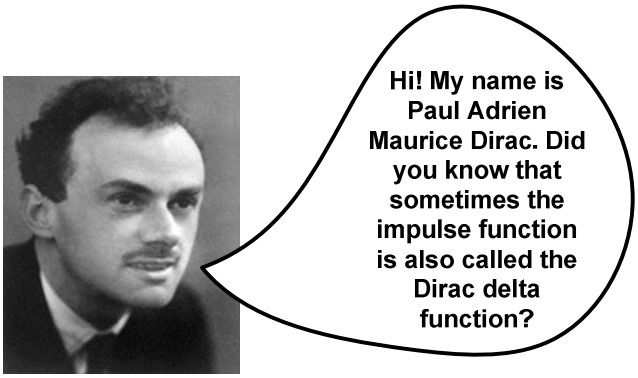
$$x(t) = 2u(t+1) + 4u(t-2) - 2r(t-3) + 4r(t-6) - 4u(t-6) - 2r(t-8)$$

(a) (12.5 points) Sketch this signal. Provide all the necessary values on your sketch.

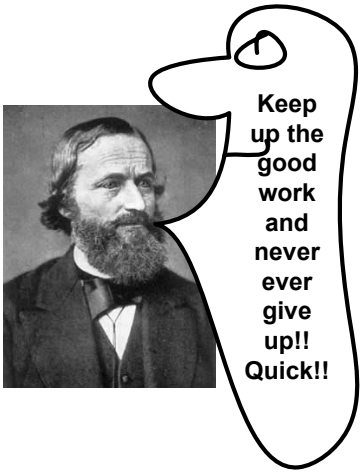


(b) (12.5 points) Using $x(t)$ given in part (a), sketch the derivative signal, dx/dt. Provide all the appropriate values on your sketch.

(3) (10 mins., 20 points) **Convolution integral.** Find the convolution integral $y(t) = x(t) * h(t)$ where the continuous-time signals $x(t)$ and $h(t)$ are given by $x(t) = [u(3+t) - u(t-3)]$ and $h(t) = \delta(t-2) + \delta(t+2)$ respectively. Provide the complete mathematical expression for the function $y(t)$ and sketch it as a function of *t*.



(4) (15 mins., Total: 25 points) **LTI system.** The impulse response of a **L**inear **T**ime-**I**nvariant (LTI) system is given by $h(t) = 5e^{2t}u(3-t)$.



(a) (5 points) Is this system memory-less? (Provide brief justification for your answer.)

(b) (5 points) Is this system causal? (Justification.)

(c) (5 points) Is this system stable? (Justification.)

(d) (10 points) Find and sketch the unit-step response of this system. (Don’t forget to sketch it! Provide appropriate values on your sketch.)