

UNIVERSITY OF TEXAS AT DALLAS
Telecommunications Engineering

TE3302 Signals & Systems
Problem Set #6: Continuous-Time Convolution

Date assigned: October 11, 2000

Date due: October 18, 2000

Homework is due at the beginning of class. Late homework will not be accepted.

Reading: *Signals & Systems*, Sections 2.3 and 2.4

You may use any computer program to help you solve these problems, check answers, etc.

Problem 6.1 Continuous-Time Convolution

Problem 2.8 in *Signals & Systems*.

Problem 6.2 Continuous-Time Convolution

Problem 2.11 in *Signals & Systems*.

Problem 6.3 Another Continuous-Time Convolution

Problem 2.22 (b) in *Signals & Systems*.

Problem 6.4 Use the following MATLAB script to determine $y(t) = x(t) * h(t)$ where $x(t) = 2e^t u(t)$ and $h(t) = e^{-t+2} u(t)$. Please turn in the hardcopy of the plots

```
t = 0:.1:6; % Form a vector for positive time
x = 2*exp(-t); % 2e^{-t}u(t)
% Create h(t)=e^{-2(t-2)}u(t-2)
t1 = 0:.1:2-0.1; % Form a time vector for zero portion of u(t-2)
t2 = 2:0.1:6; % Form a time vector for nonzero portion of u(t-2)
h = [zeros(1,length(t1)) exp(-2*(t2-2))];
% MATLAB uses conv to do convolution integral or sum

y = conv(x,h);
t3=0:.1:12; % output is longer than the input
subplot(2,2,1)
plot(t,x);xlabel('TIME');title('x(t)=2e^{-t}u(t)');grid
subplot(2,2,2)
plot([t1 t2],h);xlabel('TIME');grid
axis([0 6 0 2]); % adjust x and y axis
title('h(t)=e^{-t+2}u(t-2)')
subplot(2,1,2)
plot(t3,y);xlabel('TIME') ; title('y(t)=x(t)*h(t)');grid
```