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% Fall 2018
% Name: Terry-Ann Sneed
% Lab 4: Line Time Invariant System Response

% Exercises

clc clear
all close
all

% 1.
% zero input response % y'''+8y''+2521y'+5018y=f''+ 5018f, y(0)=1,
y'(0)=1, y''(0)=0 yo = dsolve('D3y + 8*D2y + 2521*Dy + 5018*y = 0',
'y(0) = 1', 'Dy(0) =  1', 'D2y(0) = 0'); disp(yo);

% 2. % Plot zero input response with
0<=t<=4

t = 0:0.001:4; y = (2515.*exp(-2*t))/2501 -
(14*cos(50*t).*exp(-3*t))/2501 +  (7489*sin(50*t).*exp(-
3*t))/125050; subplot(4,1,1),plot(t,y);

% 3. % Obtain symbolic expression for impulse response & plot for
0<=t<=4

h = diff(yo); j = diff(h) + 5018*yo; disp(j); ht = (12630330.*exp(-
2*t))/2501 - (80312*cos(50*t).*exp(-3*t))/2501 +
(18714703*sin(50*t).*exp(-3*t))/125050; subplot(4,1,2), plot(t,ht);

% 4. % Create a system object using tf & obtain the sero-state resp.
using  step 1

TFsys = tf([1 0 5018], [1 8 2521 5018]); [ystep, t] = step(TFsys);
subplot(4,1,3), plot(t,ystep), title('Step Response'), xlabel('t'),
ylabel('ystep(t)'); [h,t] = impulse(TFsys); subplot(4,1,4),
plot(t,h), title('Impulse Response'), xlabel('t'),  ylabel('h(t)');




%5.
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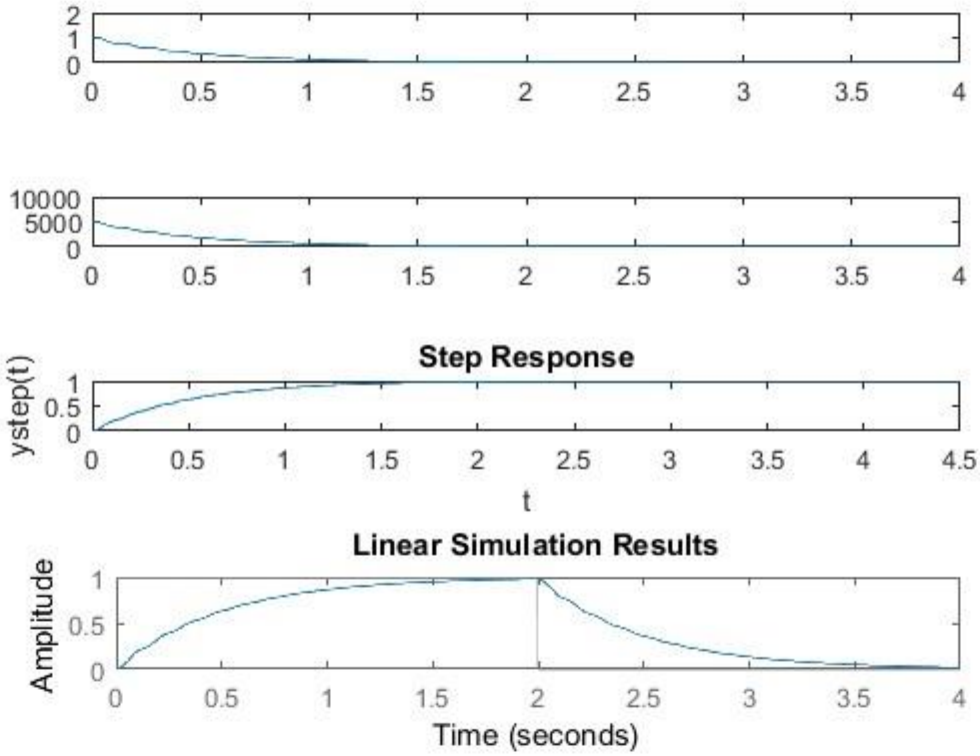
% Find the zero-state response of the system from part 1 for 0 = t = 4
with the following input using lsim. % WARNING: I have not figured out
how to implement the f = t for 0 <=  t < 1, I will ask about this
during the next lab.
t = 0:0.001:4; f =
double(rectpuls((t-1)/2));
lsim(TFsys, f, t)
```

*(2515*exp(-2*t))/2501 - (14*cos(50*t)*exp(-3*t))/2501 +*

```
(7489*sin(50*t)*exp(-3*t))/125050

(12630330*exp(-2*t))/2501 - (80312*cos(50*t)*exp(-3*t))/2501 +
 (18714703*sin(50*t)*exp(-3*t))/125050
```



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