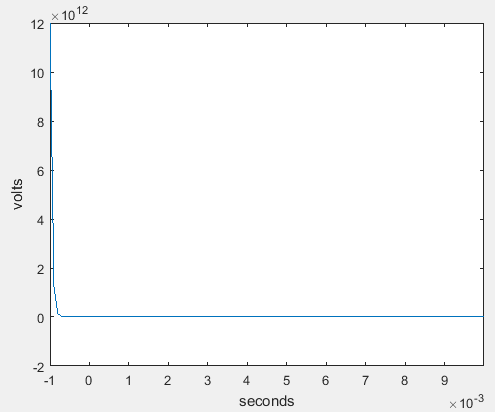
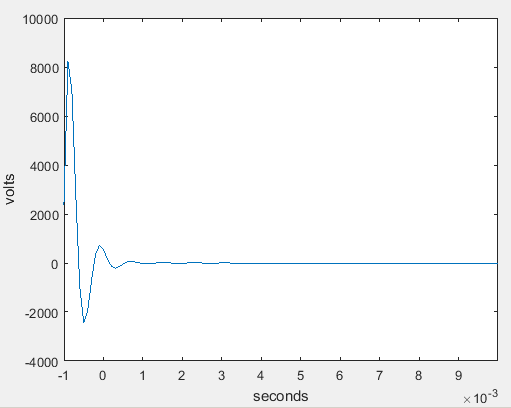
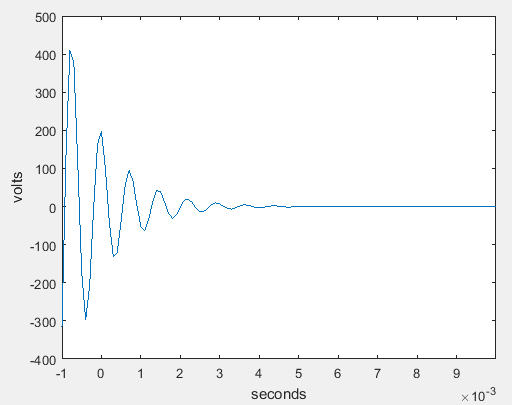
R = 8 ohms



R = 33 ohms



R = 100 ohms



r = 8;

rs = 50;

rg = r\*10;

l = 2.78e-3;

c = 4.83e-6;

t = -1:1e-4:10e-3;

p1 = (-1/(2\*r\*c))+ sqrt((1/(4\*r^2\*c^2)) - 1/(c\*l));

p2 = (-1/(2\*r\*c))- sqrt((1/(4\*r^2\*c^2)) - 1/(c\*l));

h\_t = (1/(c\*(p1-p2)\*(rs+rg)))\*(p1\*exp(p1\*t)-p2\*exp(p2\*t));

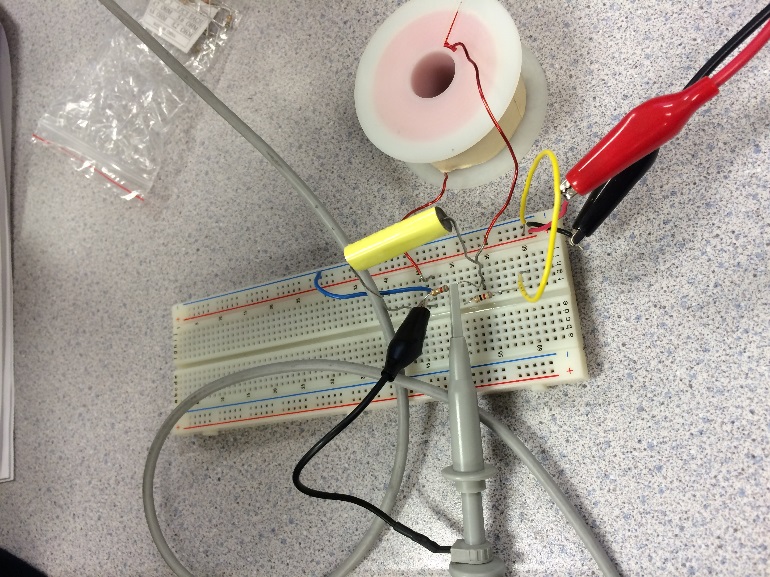
figure(1);

plot(t, h\_t);

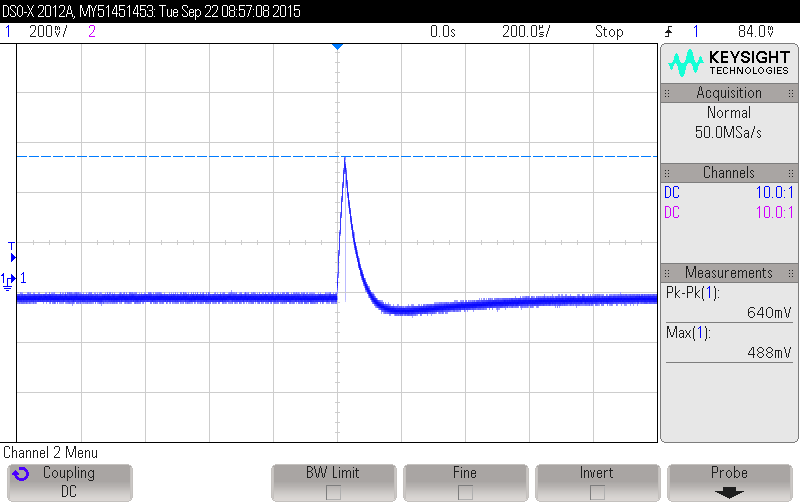
xlim([-1e-3 1e-2]);

xlabel('seconds');

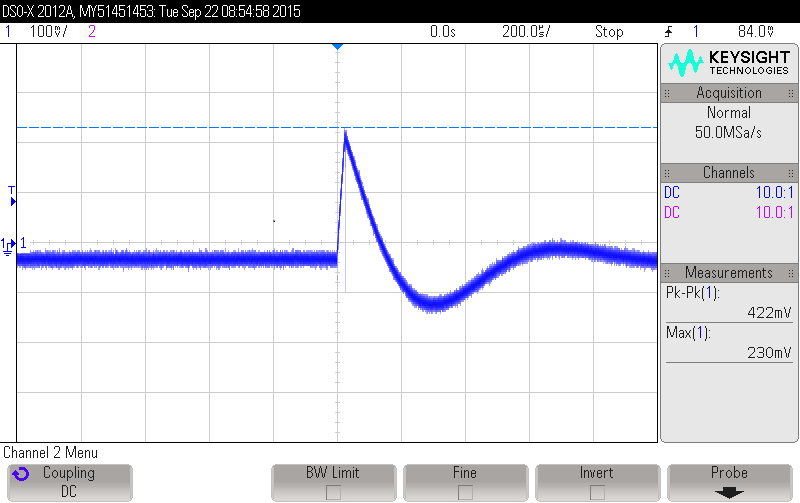
ylabel('volts');



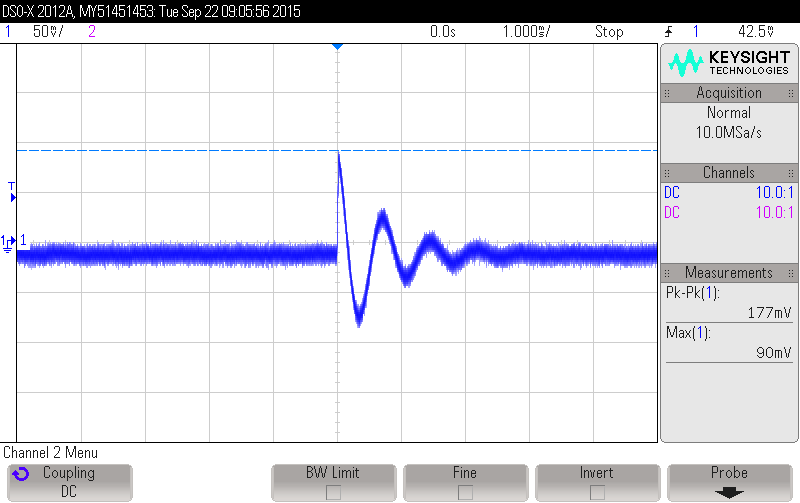
R = 8.2 ohms



R = 33 ohms



R = 100 ohms

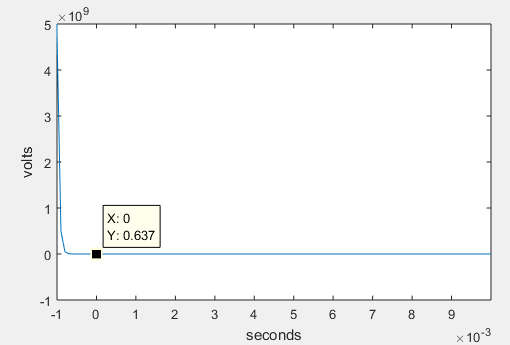


Calculated scale factor: R = 8, scale factor: 1600/.5 = 3200

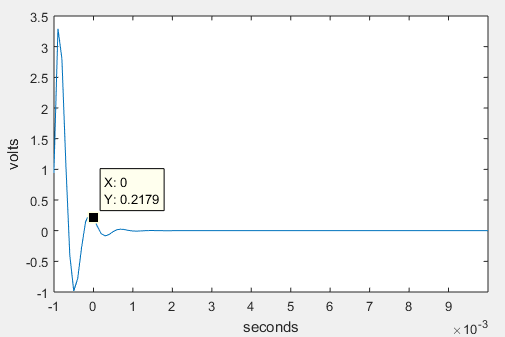
R = 30, scale factor: 550/.23 = 2391

R = 100, scale factor: 200 / .09 = 2222

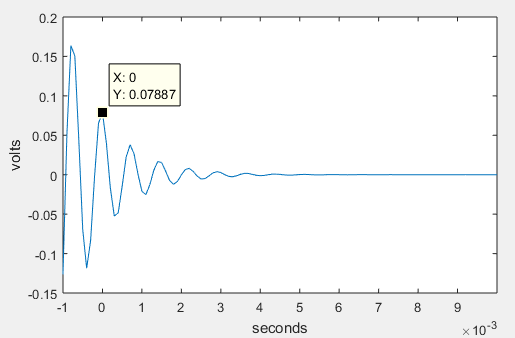
R=8



R=33



R=100



r = 100;

rs = 50;

rg = r\*10;

l = 2.78e-3;

c = 4.83e-6;

t = -1:1e-4:10e-3;

scaleFactor = 2500;

p1 = (-1/(2\*r\*c))+ sqrt((1/(4\*r^2\*c^2)) - 1/(c\*l));

p2 = (-1/(2\*r\*c))- sqrt((1/(4\*r^2\*c^2)) - 1/(c\*l));

h\_t = ((1/(c\*(p1-p2)\*(rs+rg)))\*(p1\*exp(p1\*t)-p2\*exp(p2\*t))) / scaleFactor;

figure(1);

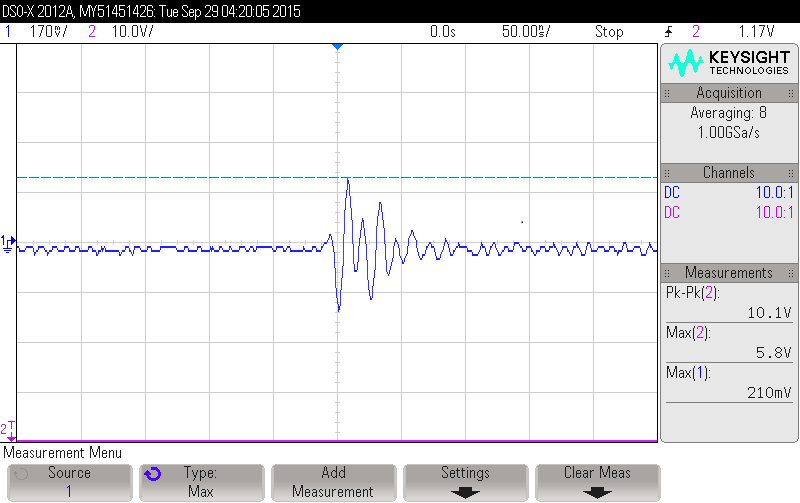
plot(t, h\_t);

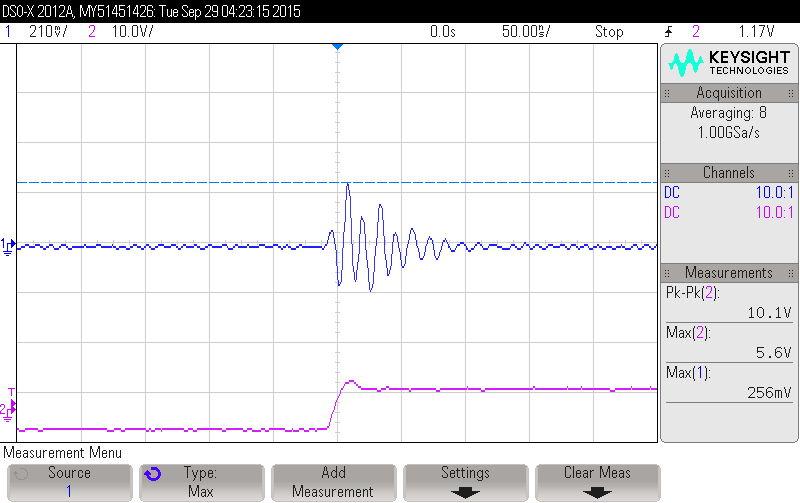
xlim([-1e-3 1e-2]);

xlabel('seconds');

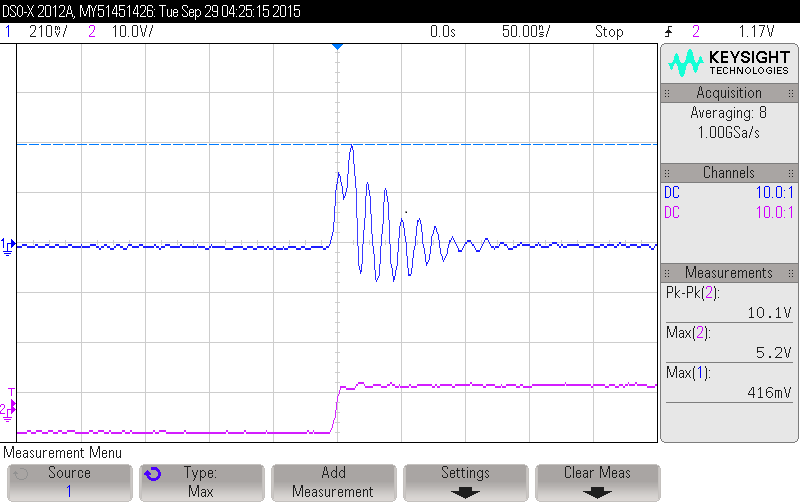
ylabel('volts');

Output to a rect. function with R = 33 ohms

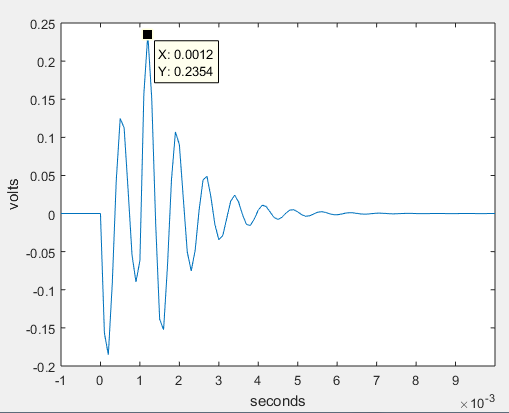


Output to a rect. function with R = 100 ohms

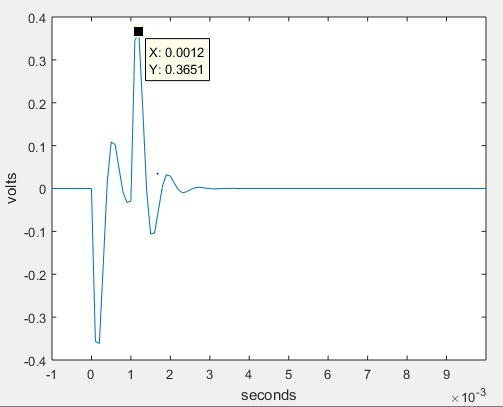
Output to a rect. function with R = 8 ohms



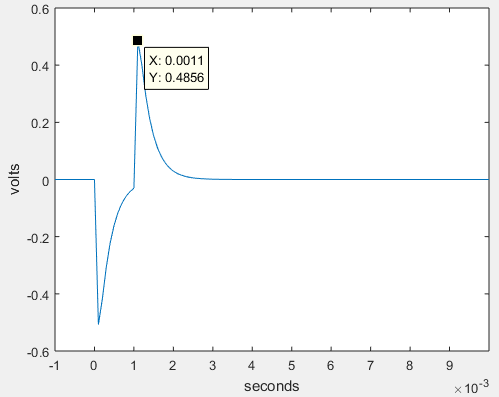
Convolution of h\_t and rect\_t with R = 100 ohms



Convolution of h\_t and rect\_t with R = 33 ohms



Convolution of h\_t and rect\_t with R = 8 ohms



Convolution Code:

r = 8;

rs = 50;

rg = r\*10;

l = 2.78e-3;

c = 4.83e-6;

t = -1:1e-4:10e-3;

scaleFactor = 2500;

p1 = (-1/(2\*r\*c))+ sqrt((1/(4\*r^2\*c^2)) - 1/(c\*l));

p2 = (-1/(2\*r\*c))- sqrt((1/(4\*r^2\*c^2)) - 1/(c\*l));

h\_t = ((1/(c\*(p1-p2)\*(rs+rg)))\*(p1\*exp(p1\*t)-p2\*exp(p2\*t))) / scaleFactor;

t\_0 = 1e-3;

t1 = t - t\_0;

constant = 1/(c\*(p1-p2)\*(rs+rg));

funct1 = constant\*(-exp(p1\*(t)) + exp(p2\*(t))).\*(t<t\_0);

funct2 = constant\*(-exp(p1\*(t))+ exp(p2\*(t)) + exp(p1\*(t1))-exp(p2\*(t1))).\*(t>=t\_0);

Convolved = (funct1 + funct2).\*(t>0).\*10;

figure(1);

plot(t, Convolved);

xlim([-1e-3 1e-2]);

xlabel('seconds');

ylabel('volts');

Matlab Code with conv funct.

r = 33;

rs = 50;

rg = r\*10;

l = 2.78e-3;

c = 4.83e-6;

t = -.001:1e-5:10e-3;

scaleFactor = 2500;

p2 = (-1/(2\*r\*c))+ sqrt((1/(4\*r^2\*c^2)) - 1/(c\*l));

p1 = (-1/(2\*r\*c))- sqrt((1/(4\*r^2\*c^2)) - 1/(c\*l));

h\_t = ((1/(c\*(p1-p2)\*(rs+rg)))\*(p1\*exp(p1.\*t)-p2\*exp(p2.\*t))) / scaleFactor.\* (t >= 0);

t\_0 = 1e-3;

rect\_t = double(t>=0 & t <= t\_0);

x = conv(rect\_t, h\_out);

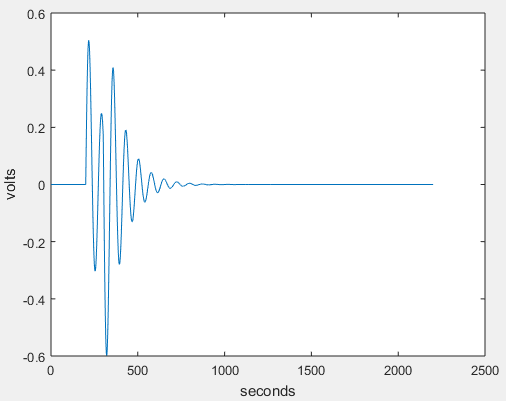
figure(1);

plot(x);

xlabel('seconds');

ylabel('volts');

R = 8, 33, 100 All three graphs produced this output.9



5. Other possible sources of error include: differences in actual values of the inductor and capacitor. We did not measure what the exact value of them were. We just used the printed value and did not take into account the tolerance. Other issues are noise when taking the values from o-scope,

TASK TWO SIGN OFF x\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Task 3: 3. How closely does your plot match the real observed result?