NAME_____

Unified Quiz S6

April 22, 2004

One 8 1/2" x 11" sheet (two sides) of notes
Calculators allowed.
Calculators may be used for arithmetic only.
No books allowed.

- **Put your name on each page of the exam.**
- **Read all questions carefully.**
- **Do all work for each problem on the two pages provided.**
- **Show intermediate results.**
- **Explain your work --- don't just write equations. Any problem without an explanation can receive no better than a "B" grade.**
- **Partial credit will be given, but only when the intermediate results and explanations are clear.**
- **Please be neat. It will be easier to identify correct or partially correct responses when the response is neat.**
- **Show appropriate units with your final answers.**
- **Box your final answers.**

Exam Scoring

#1 (25%)	
#2 (25%)	
#3 (25%)	
#4 (25%)	
Total	

Problem 1 **Name** _____

A causal, LTI system, G, has impulse response $g(t)$. The Laplace transform of $g(t)$ is

$$G(s) = \frac{4}{(s+1)^2(s+3)}$$

1. What is the region of convergence of the Laplace transform? Explain.
2. Is the system stable or unstable? Explain.
3. Find $g(t)$.

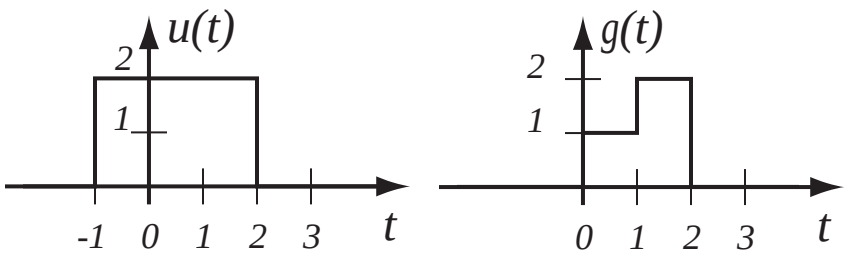
Problem 1 **Name** _____

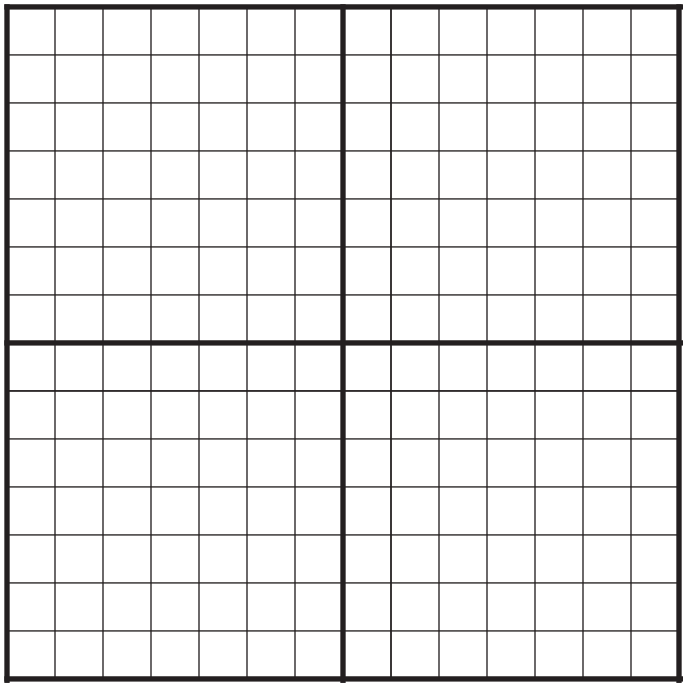
Problem 2 **Name** _____

Given the signals $g(t)$ and $u(t)$ as plotted below, find the signal $y(t)$ given by

$$y(t) = g(t) * u(t)$$

Sketch the result in the grid below, as accurately as possible. Be sure to label the axes of the grid. Explain your reasoning on the page that follows.





Problem 2 **Name** _____

Problem 2 **Name** _____

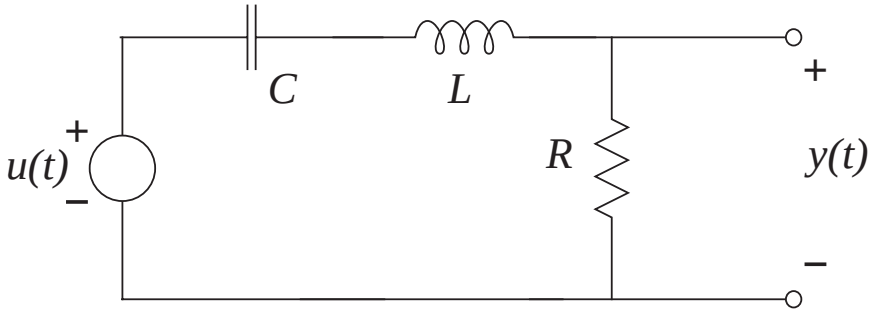
Problem 3 **Name** _____

Consider an LTI system G with input signal $u(t)$ and output signal $y(t)$. Explain why knowing the step response of the system allows one to determine the response of the system to an arbitrary input $u(t)$. You should do more than just give the equation for $y(t)$ — you should explain why the result is true.

Problem 3 **Name** _____

Problem 4 **Name** _____

Find the step response of the circuit below. The component values are $C = 0.5$ F, $L = 1$ H, and $R = 3\ \Omega$.



Problem 4 **Name** _____