ENGR 12 TEST 3 100 Points NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| 1. (10 pts) A **0.1H** inductor is driven by the a current pulse *i(t) = 4t-t2* Amps over the time interval *0<=t<=4* seconds. The current is 0 outside of this time period.
 |   |

* 1. Find the voltage over this same time period:
	2. What is the energy in the inductor at 0 sec:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 2 sec\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. (20 pts) Find the steady state solution for io(t) if vg(t) = 40cos(500t) Volts



1. (30 pts) The switch has been open in the following circuit for a long time before closing at t=0.



Find

1. this is a (circle one) natural/step response
2. the initial current i in the inductor at t=0- \_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. the final current i in the inductor at t = infinity \_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. the effective resistance seen by the inductor for t>0 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. time constant tau for t>0 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
6. the expression for i(t) for t>0 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
7. (40 pts) The switch has been closed a long time before opening at t=0

8. this is a (circle one of each pair) **series**/parallel **step**/natural response
9. Find IL(0-) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
10. Find Vc(0-) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
11. Find IL(∞) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
12. Find Vc(∞) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
13. Find α \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
14. Find wo \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
15. Critically Damped, Underdamped or Overdamped ? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
16. Find dVc/dt(0+) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
17. Find the complete solution for v(t) for t>0