Motivation: In power electronics we very often must solve time-domain circuit equations. This first problem set should be a review for you, to give you a chance to brush up on solving circuit differential equations. Because of the short turn-around time on this problem set (note the due date), there are only two questions.

Problem 0.1

Shown in Figure 0.1 is a diagram of a circuit used to generate a large pulsed magnetic field. The capacitor is pre-charged to a voltage $V_x$, which can be between 0 and 1000 V. At time $t=0$, the switch $S$ is closed to trigger the magnetic pulse. The value of $R$ is 85 mΩ, $C$ is 180 μF, and $L$ is 13 μH. The switch $S$ and diode $D$ are ideal.

Calculate the following:

1. The time response of the coil current ($i_{coil}$) after the switch $S$ is closed, as a function of the pre-charge voltage $V_x$.

2. The peak coil current for $V_x = 1000$ V.

3. The time $t_1$ at which diode $D$ turns on.

4. The energy dissipated in the resistor $R$ for $V_x = 1000$ V.

![Figure 0.1](image-url)
Problem 0.2

Sign up in Piazza https://piazza.com/illinois/fall2017/ece464/home and answer - What would you like to accomplish in this course? You can be anonymous if you feel more comfortable--it is up to you.

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