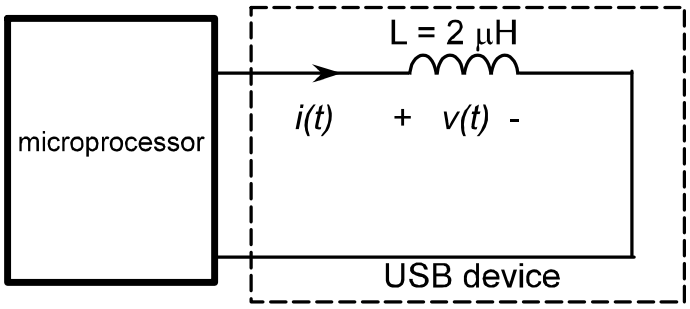
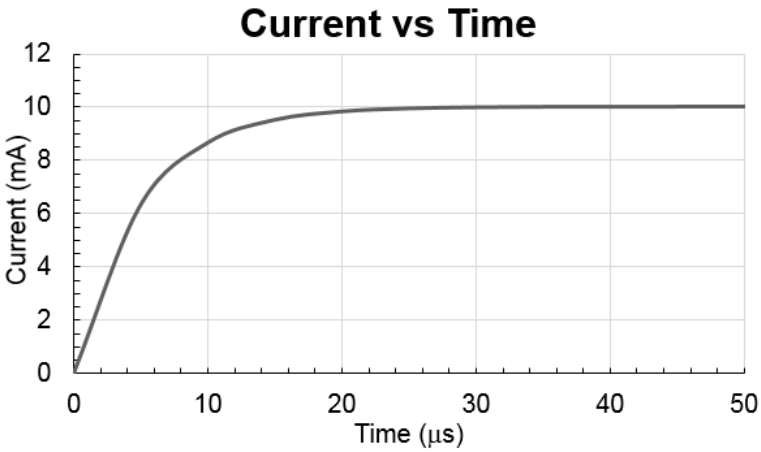
Homework Set #1
Textbook: Chapter 6.1-2
Coverage: Capacitance and Self Inductance
DUE Tuesday September 5, 2017 – Start of Class

You must do the calculus and sketching by hand, but you can use a calculator/Maple to check.

1. A microprocessor communicates over wires (such as a USB cable) by sending very short pulses. The device at the far end of the cable (such as a memory stick) senses the pulses with electronics that has inductance and negligible capacitance. The appropriate model is shown below.





$$i(t) = \begin{cases} 0 & t < 0\ \mu s \\ 10(1 - e^{-200000t})\ mA & 0 < t < 40\ \mu s \\ 10\ mA & t > 40\ \mu s \end{cases}$$

a) Find the voltage $v_L(t)$ for $0\ \mu s < t \leq 40\ \mu s$ and sketch your results.
b) Find the power absorbed by the inductor at $t = 10\ \mu s$. *(slightly over 4.5 μW)*
c) Find the energy stored in the inductor at $t = 10\ \mu s$. *(slightly under 75 pJ)*

2. Problem 6.2 *Answers in back of book*

3. Problem 6.16 *sketch in back of book*

4. Problem 6.21 *Answers in back of book*