2. Consider the circuit below:

\[ V_0 = 2.75 \text{ V}, \quad t_d = 2\text{nS} \]
\[ R = 400\text{ n}
\[ L = 113\Omega \]
\[ 1\mu F (v=110) \]

a) On the graph below, plot \( V_0 \) for \( t = 0 \) to \( t = 10\text{nS} \). Clearly label voltages.
b) Indicate on your plot the voltage and time at:
   1) \( t = 4\text{nS} \)
   11) \( t = 3\text{nS} \)

Hint: Note that \( V_0 \) is not the voltage across the inductor but across both inductor and resistor. So, \( V_0 = V_L + V_R \).

- Equivalent circuit:
  \[ V_0 = \frac{1}{113} \cdot \frac{3}{2} \times 110 \text{ V} = \frac{420}{113} \text{ V} = 3.7\text{ V} \]

- Final voltage at \( V_0 \) is a voltage divider, \( \left( \frac{1}{113} \right) 1 = 0.601\text{ V} \)

- Waveform will occur circuit at the inductor, have full-sized positive reflection followed by decay as current builds in the inductor.

\( V_0 = V_L + I_L R_L \); \( V_0 \) is found using

\[ V_0(t) = \left[ V_0(\infty) + V_0(t_{d}) - V_0(\infty) \right] e^{-(t-t_d)/\tau} + V(t+t_d) \]

with \( t > t_d \)

\[ V_0(t) = 0.601 + \left[ 0.601 - 0.601 e^{-(t-4)/\tau} \right] \]

\( e^{t} = 4 \quad V_0(t) = 0.601 + 0.399 e^{3} \)

\( e^{3} = 27 \quad V_0(t) = 0.601 + 0.399 e^{-3} \)