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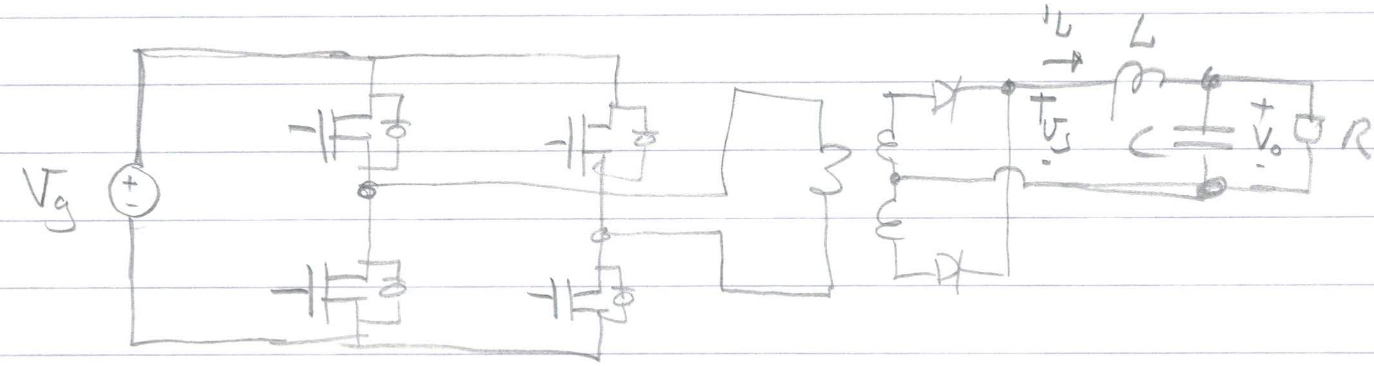
# Problem 12.4

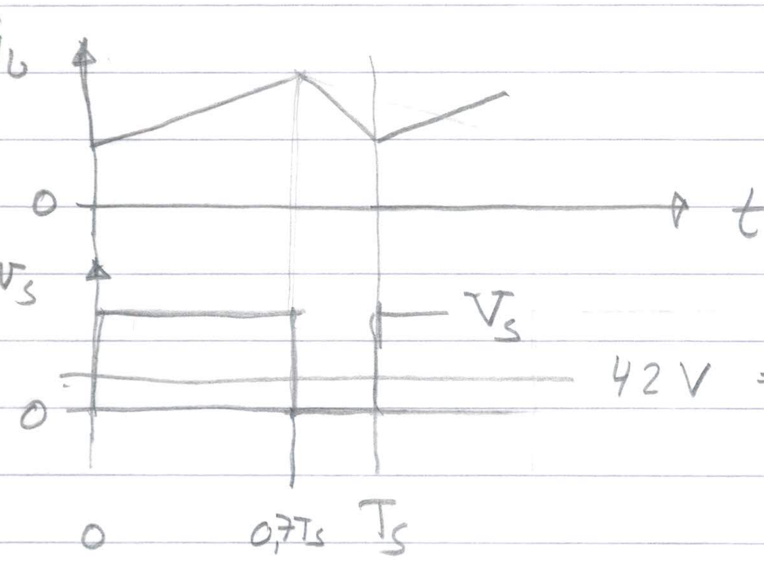



$V_g = 320V$ $\qquad T_s = 10\mu s$

$P_R = 1000W$ $\qquad V_o = 42\,V$ $\qquad D = 0.7$

$L = 50\,\mu H$ $\qquad C = 100\mu F$

a)




$42V = V_o = \langle v_s \rangle_{T_s}$

$V_s \cdot D = V_o$ $\qquad V_s = \frac{42}{0.7}$ $\qquad \underline{V_s = 60\,V}$

$m_1 = \frac{V_s - V_o}{L}$ $\qquad m_2 = \frac{V_o}{L}$

$m_1 = \frac{60-42}{50\mu} = \underline{\underline{0{,}36\,A/\mu s}}$ $\qquad m_2 = \frac{42}{50\mu s} = \underline{\underline{0.84\,A/}}$

b) 12.4 continued

minimum ramp $m_a$ that will give stability:

$$1 = \frac{m_2 - m_a}{m_1 + m_a}$$

$$m_a + m_1 = m_2 - m_a$$

$$2m_a = m_2 - m_1$$

$$\boxed{m_a = \frac{m_2 - m_1}{2}}$$

$$\frac{m_2}{m_1} = \frac{D}{D'} \quad \text{in steady state}$$

$$m_a = \frac{m_2 - m_2 \frac{D'}{D}}{2}$$

$$m_a = m_2 \frac{1 - D'/D}{2}$$

c)

$$m_2 = \frac{V_o}{L} \qquad m_2 = \frac{42}{50\mu} \qquad m_2 = 0.84\ A/\mu s$$

$$m_a = 0.84\ A/\mu s \left(\frac{1 - 0{,}3/0{,}7}{2}\right) = 0.24\ A/\mu s$$