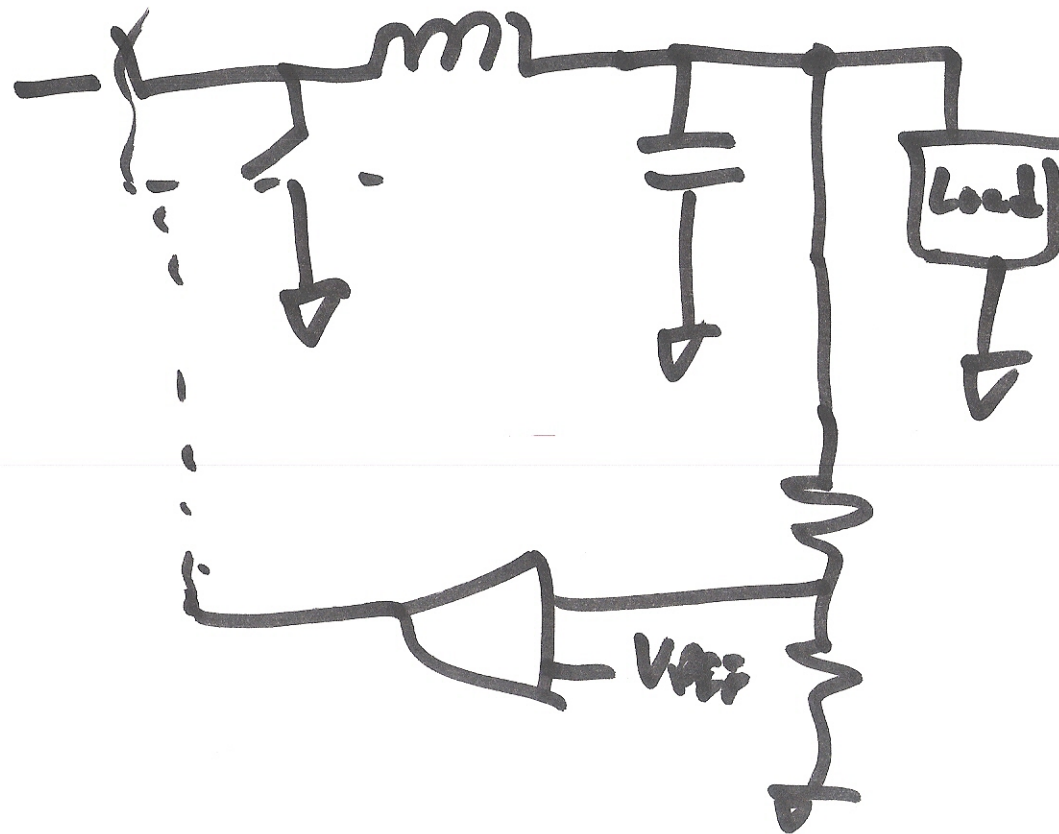


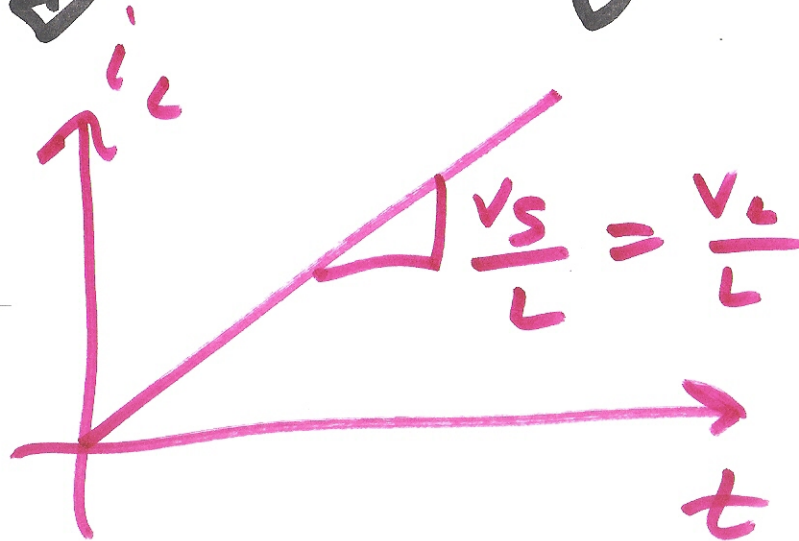
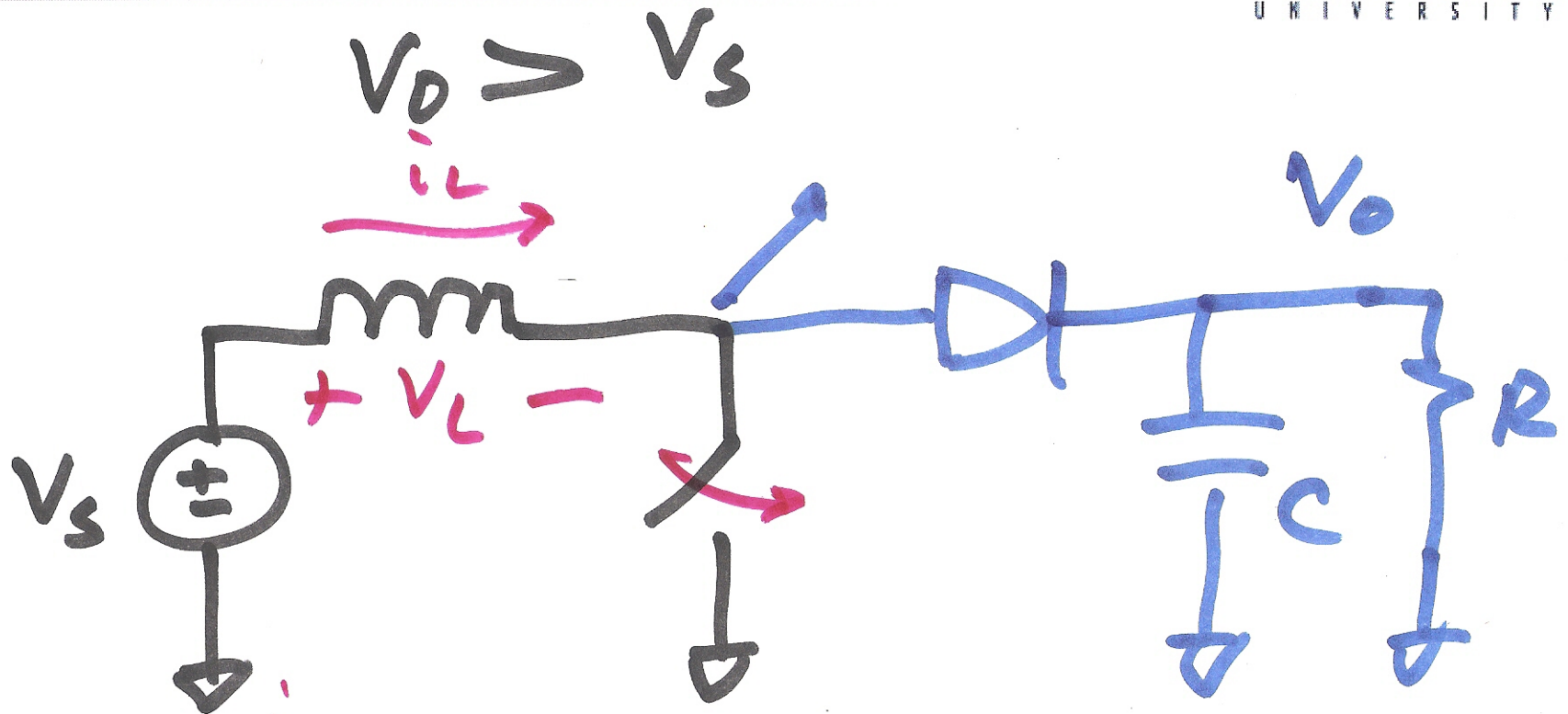
Sept. 20, 2010

Lecture 11!

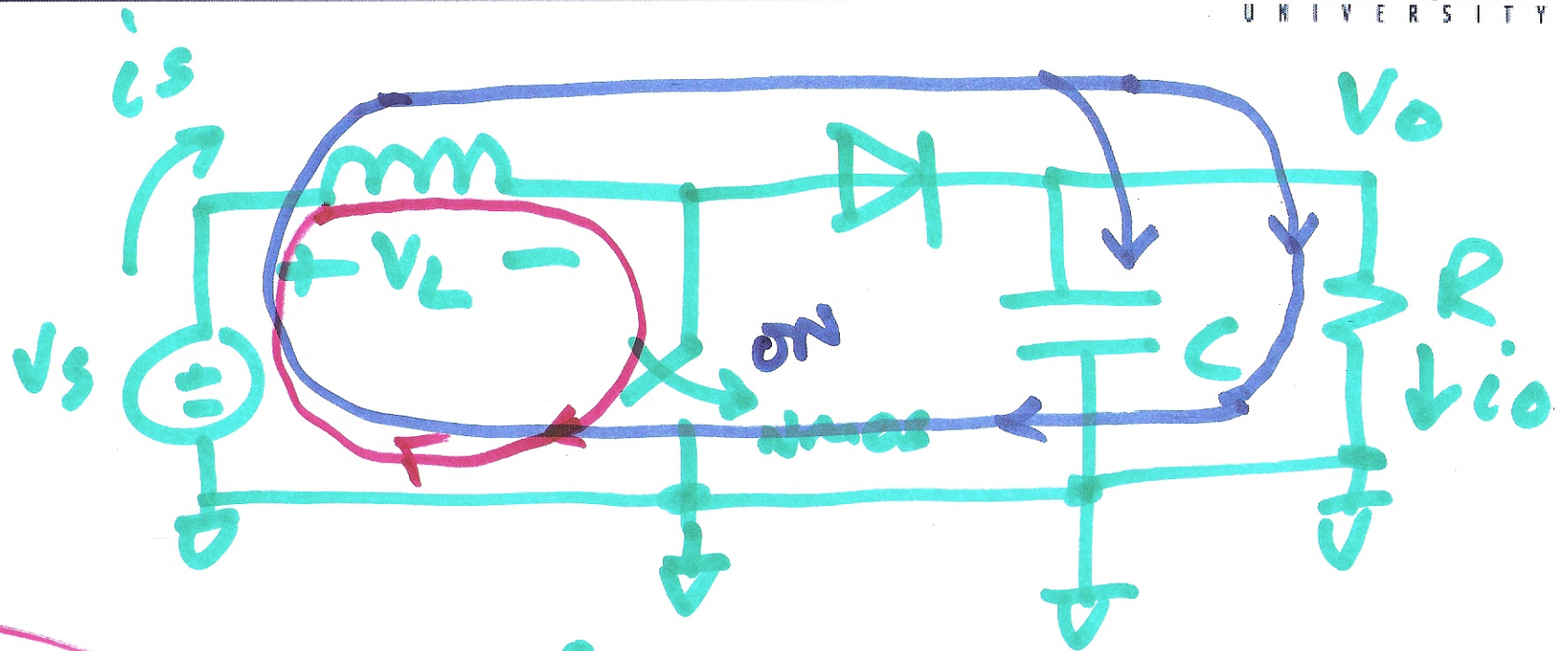


11

BOOST DC-DC Converter



2)



Buck

$$V_o < V_s$$

$$V_s \cdot D = V_o$$

100%

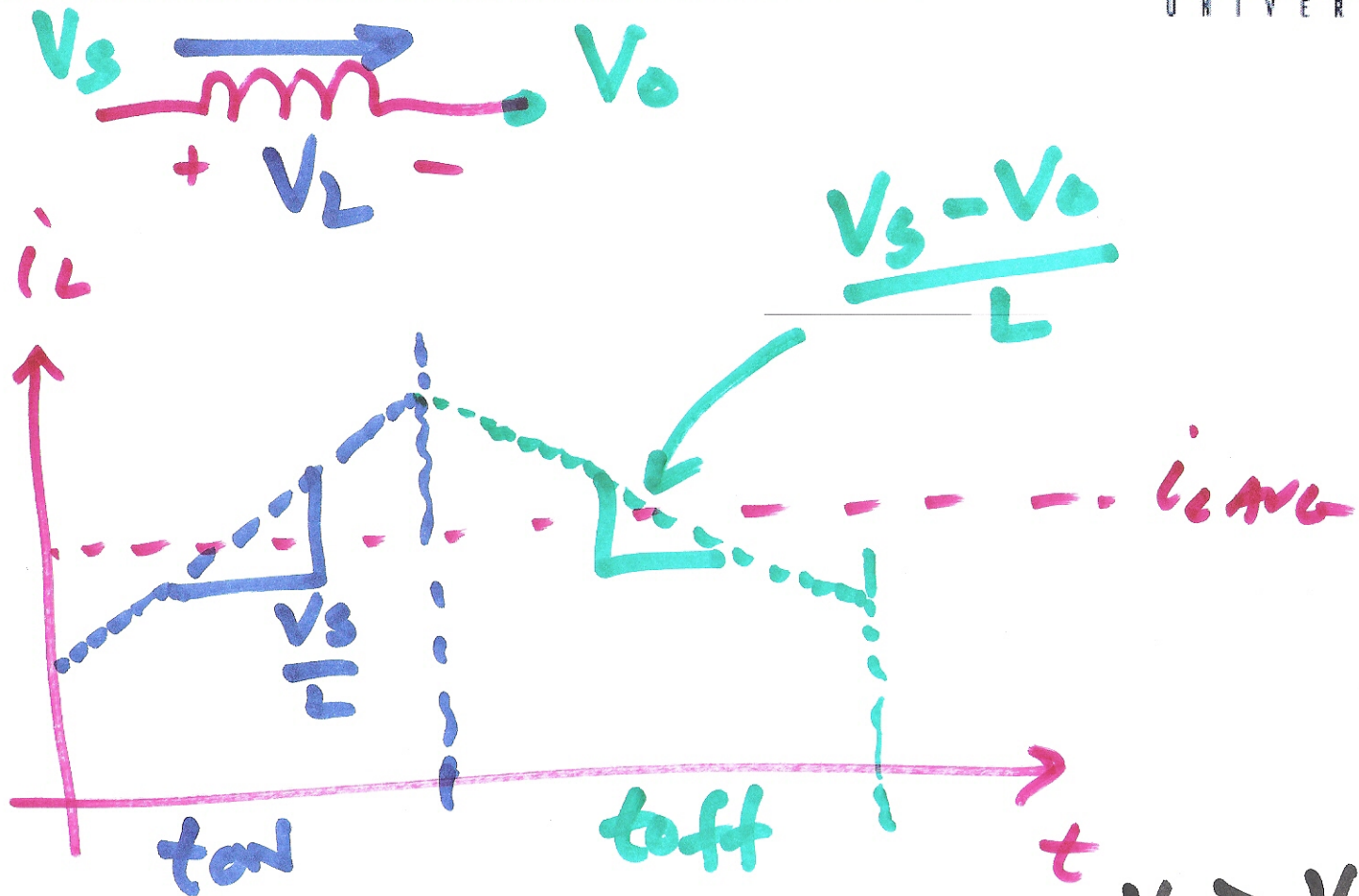
$$V_s \cdot i_s = V_o \cdot i_o$$

$$V_o > V_s$$

$$i_o < i_s$$

$$\rightarrow i_s \cdot D = i_o$$

3)



$V_o > V_s$
 $V_o = \frac{V_s}{D}$

$T \cdot D = t_{on}$
 $t_{off} = T \cdot (1 - D)$

$\frac{V_s}{L} \cdot T \cdot D = \left(\frac{V_s - V_o}{L} \right) (1 - D) T$

4)

wrong?

$$\cancel{V_s} \cdot D = \cancel{V_s - V_o} - \cancel{V_s - V_o} \cdot D$$

$$\cancel{V_s} (D - 1 + D) = V_o (D - 1)$$

$$V_o = \frac{V_s \cdot (2D - 1)}{D - 1}$$

$$D = \frac{1}{2}$$

.7

$$\frac{1.4 - 1}{.3}$$

$$V_o = \frac{V_s \cdot 0}{.5}$$

$$\frac{4}{.3}$$

5)

$$\frac{V_s}{L} \cdot T \cdot D + \left(\frac{V_s - V_o}{L} \right) (1-D) T = 0$$

$$V_o = \frac{V_s}{1-D}$$

$$D = \frac{1}{2}$$

$$V_o = 2V_s$$

6)

Switch closed

$$V_L = V_S$$

$$V_L = L \frac{di_L}{dt} \rightarrow \Delta i_L = \frac{V_S}{L} \cdot \Delta t$$

$DT = t_{on}$

Switch open

$$V_L = V_S - V_O$$

$$\Delta i_L = \frac{V_S - V_O}{L} \cdot \Delta t$$

\uparrow
 t_{off}

$(1-D)T$

\curvearrowright

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$$\Delta i|_{\text{open}} + \Delta i|_{\text{closed}} = 0$$

$$V_o = \frac{V_s}{1-D}$$



$$\Delta i_L = I_L - \frac{\Delta i_L}{2} = \Delta I_{min}$$

8)