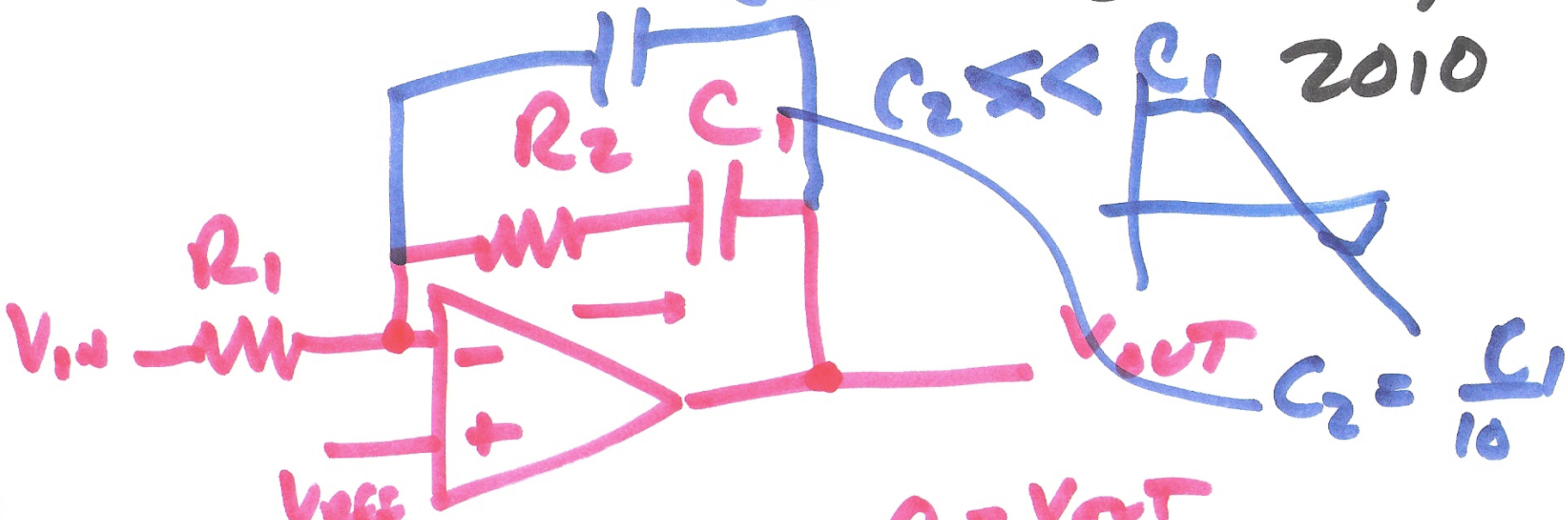
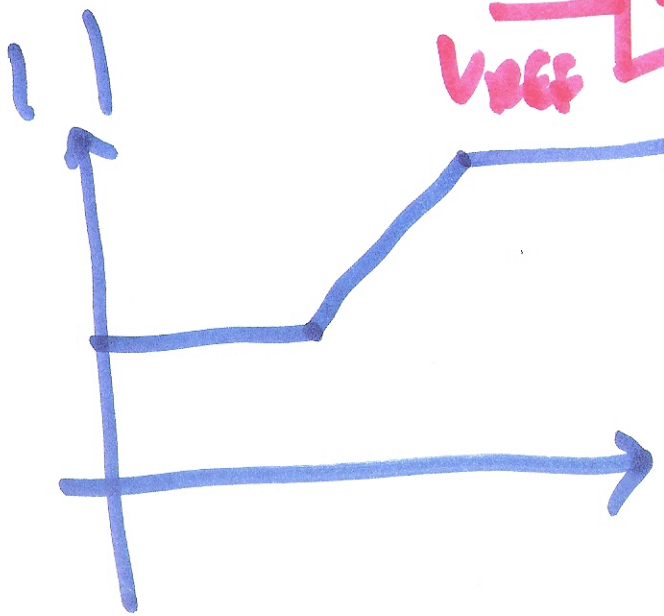
ECE 5/472 Power Electronics

BOISE STATE UNIVERSITY

Lecture 25 OCT. 27, 2010

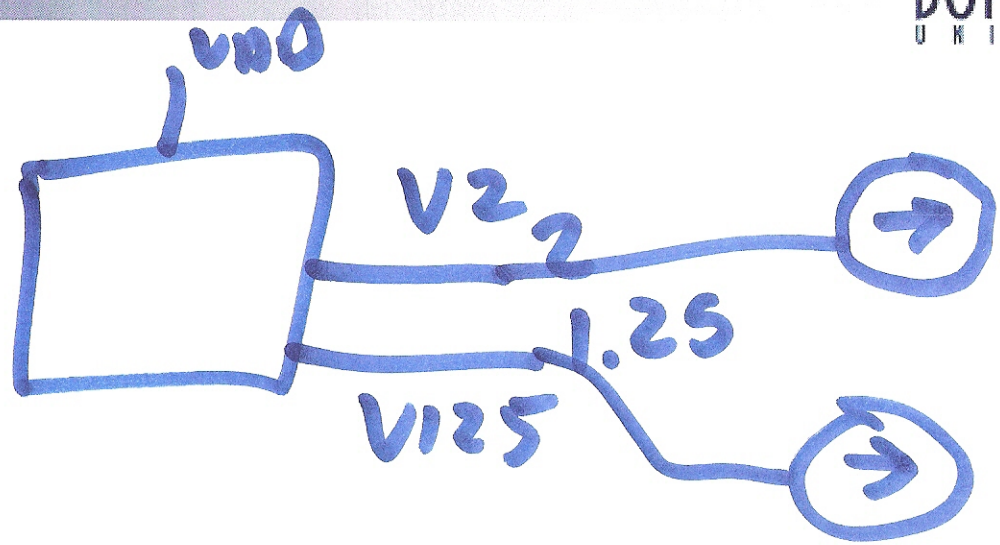


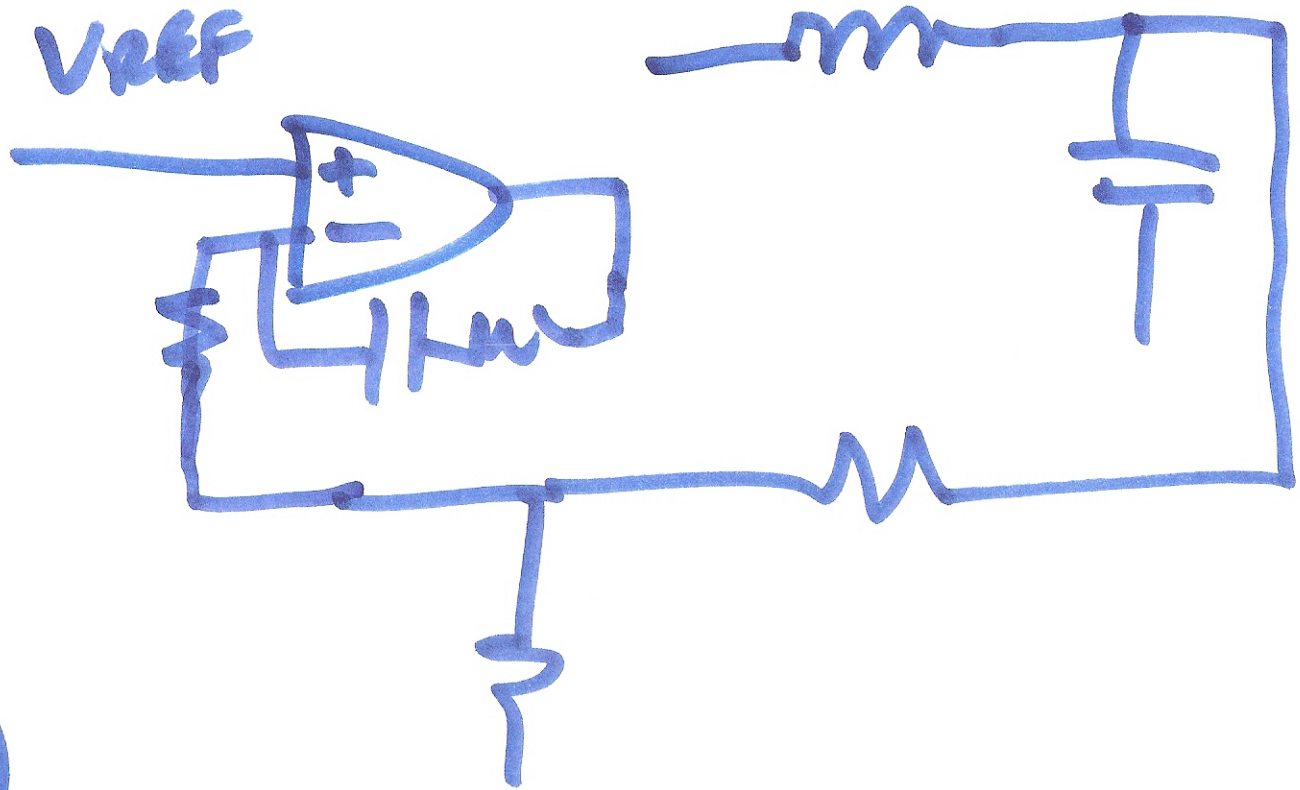


$$\frac{V_{in}}{R_1} = \frac{0 - V_{out}}{R_2 + \frac{1}{j\omega C_1}}$$

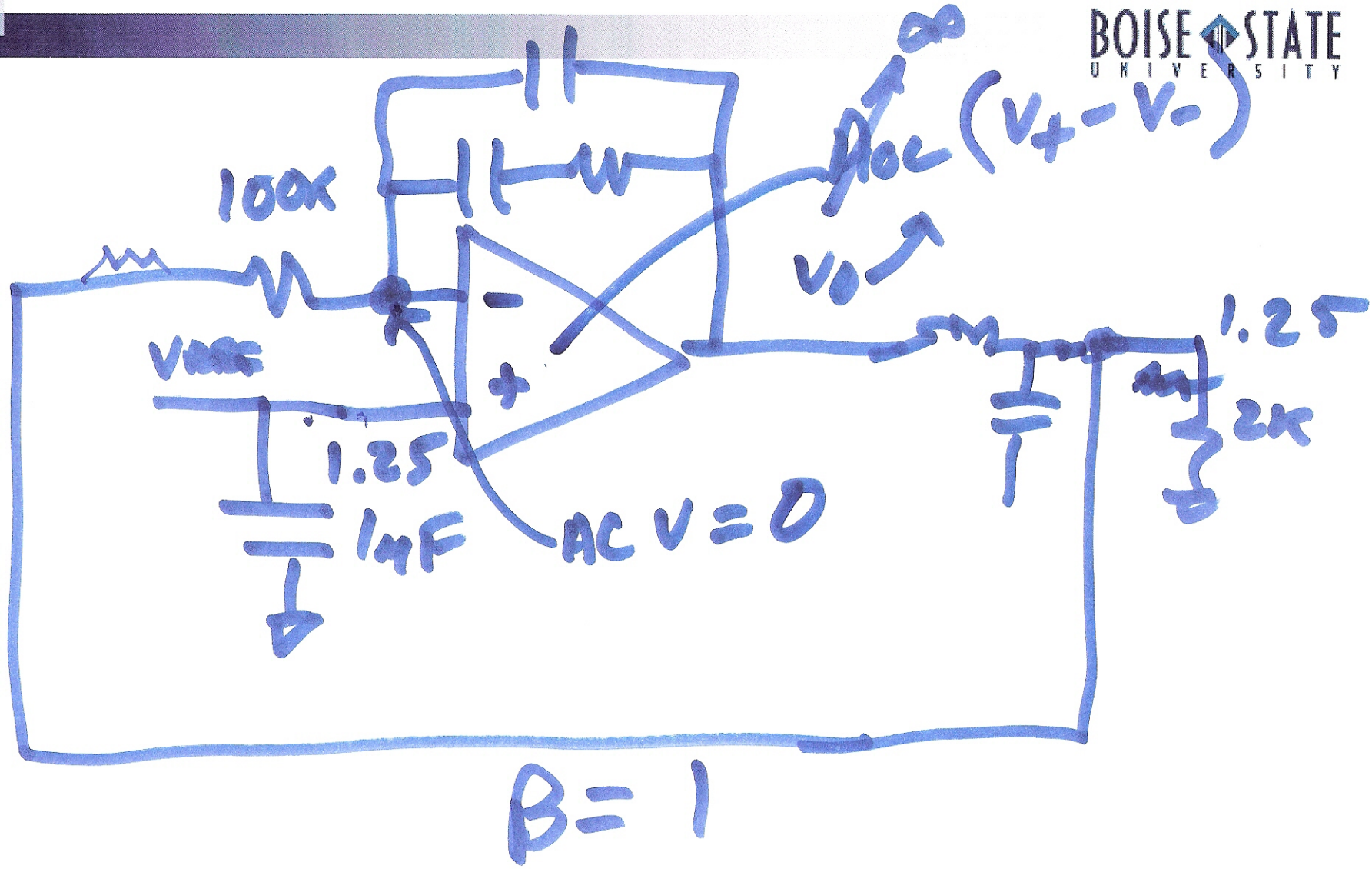
$$\frac{V_{out}}{V_{in}} = \underbrace{-\frac{R_2}{R_1}}_{\text{PROP.}} + \underbrace{\frac{1}{j\omega C_1 R_1}}_{\text{INT.}}$$

1)

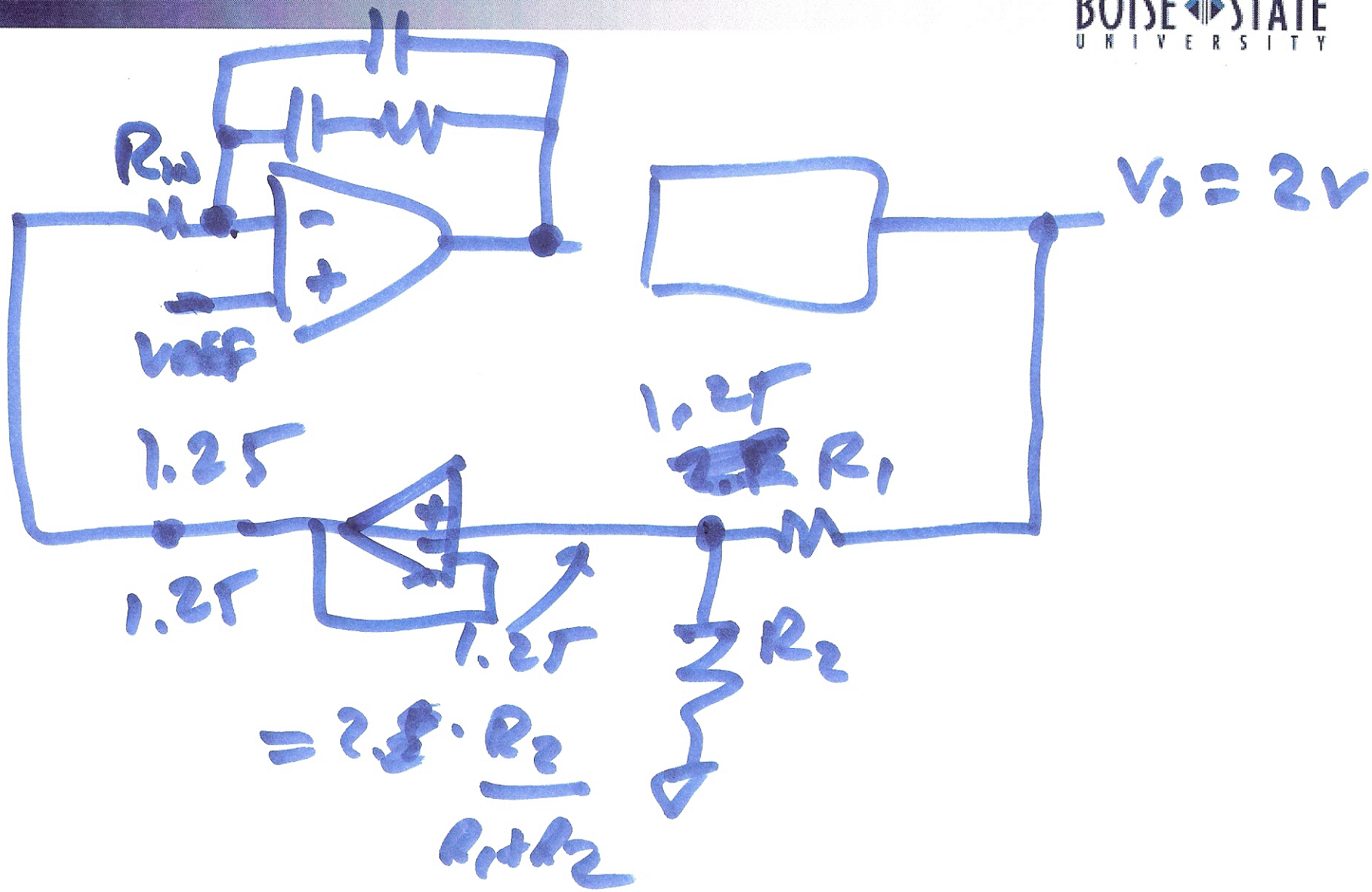




2)



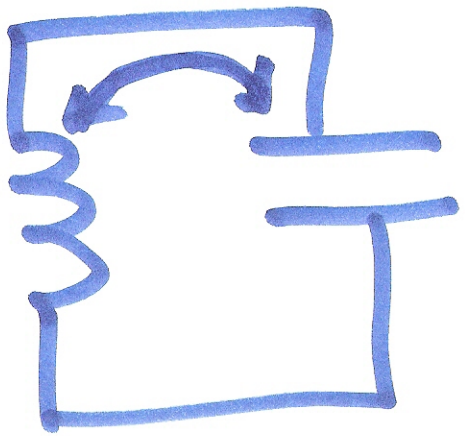
3)

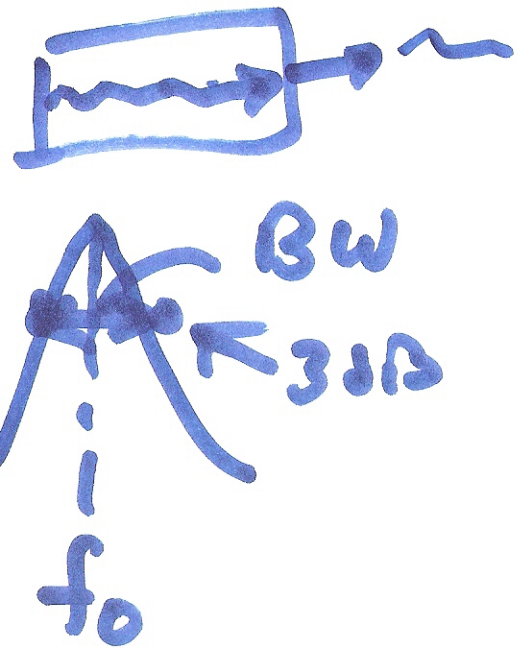


4)

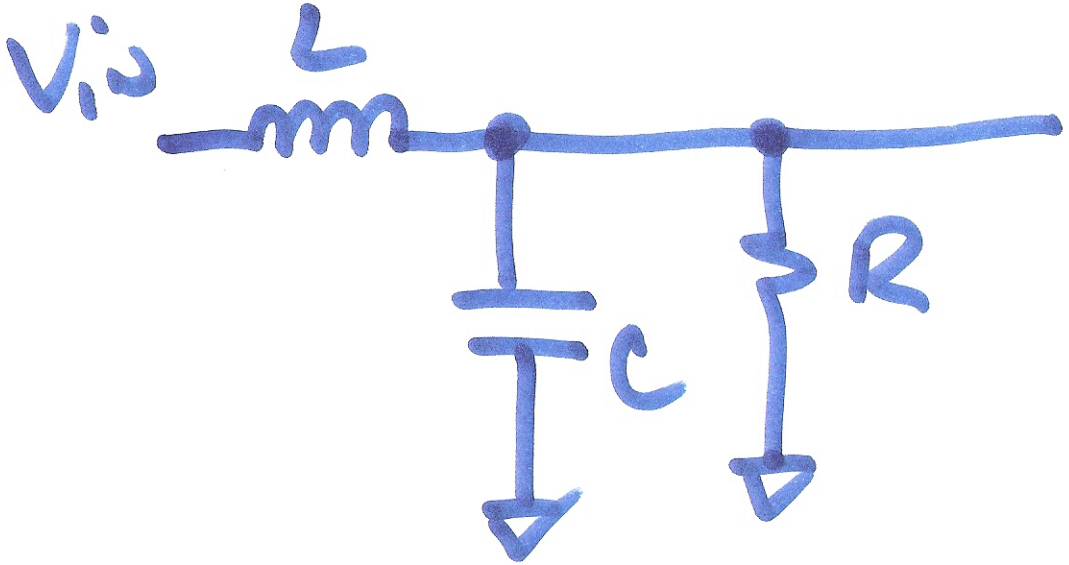
$$Q = \frac{\text{energy stored}}{\text{energy lost}}$$

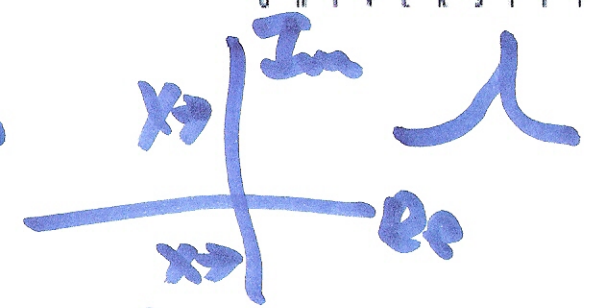
$$Q = \frac{f_0}{BW}$$





5)





$$\frac{R}{1+SRC}$$

$$\frac{V_O}{V_{IN}} = \frac{\dfrac{R}{1+SRC}}{\dfrac{R}{1+SRC} + SL}$$

6)

$$\frac{V_o}{V_{in}} = \frac{R}{R + SL + S^2RLC}$$

$$= \frac{1}{LC} \cdot \frac{1}{S^2 + \frac{S}{RC} + \frac{1}{LC}}$$

$$= \frac{1}{LC} \cdot \frac{1}{(S + P_1)(S + P_2)}$$

$$P_1, P_2 = \frac{-\frac{1}{RC} \pm \sqrt{\left(\frac{1}{RC}\right)^2 - \frac{4}{LC}}}{2}$$

7)

$1ms \rightarrow \frac{1}{2\pi \cdot 1ms} = 159\,Hz$

$$P_1, P_2 = \frac{-\frac{1}{RC} \pm \sqrt{\left(\frac{1}{RC}\right)^2 - \frac{4}{LC}}}{2}$$

$$f_0 = \frac{1}{2\pi\sqrt{LC}}$$

$$= \frac{1}{2\pi \cdot 10^{-6} \cdot \sqrt{100 \cdot 400}}$$

$$= \frac{1}{2\pi \cdot 2 \cdot 100 \cdot 10^{-6}}$$

$$= \frac{1}{2} 1.59K$$

$$= .79\,kHz$$

8)