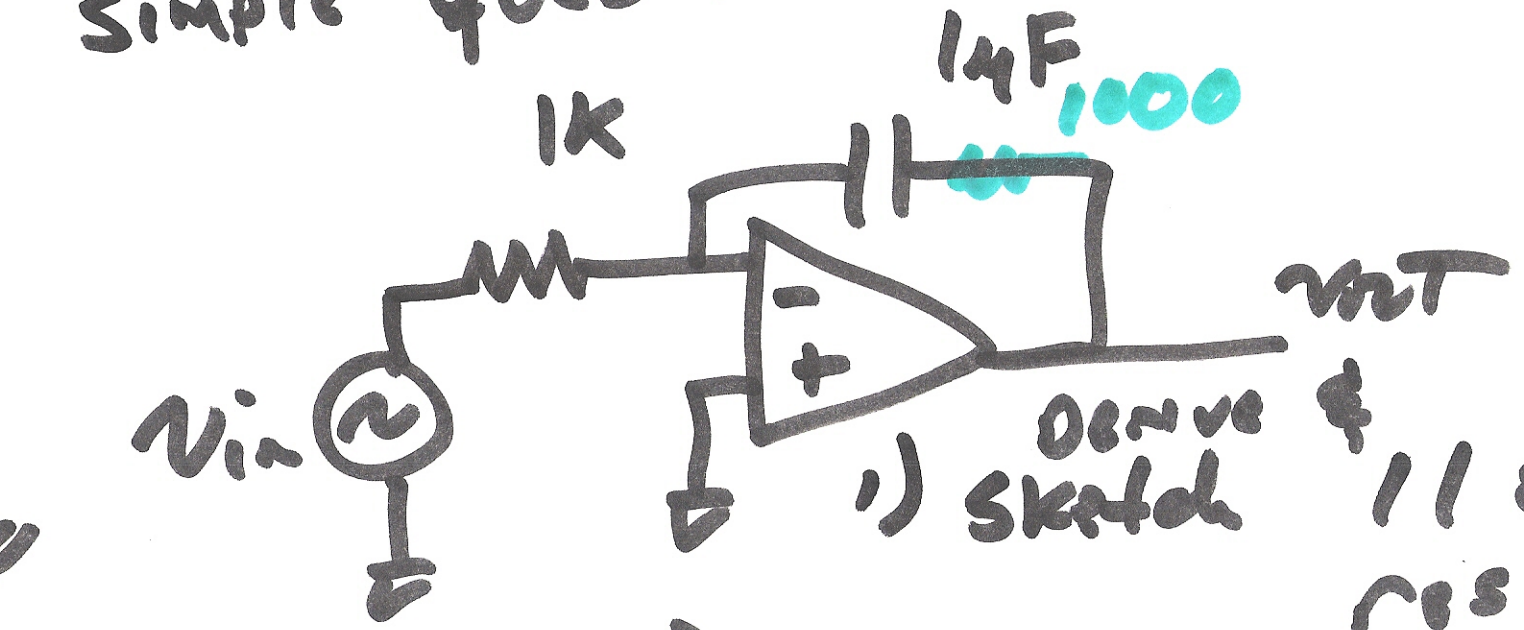
ECE 5/472 Power Electronics

BOISE STATE UNIVERSITY

Lecture 31 NOV. 5, 2010

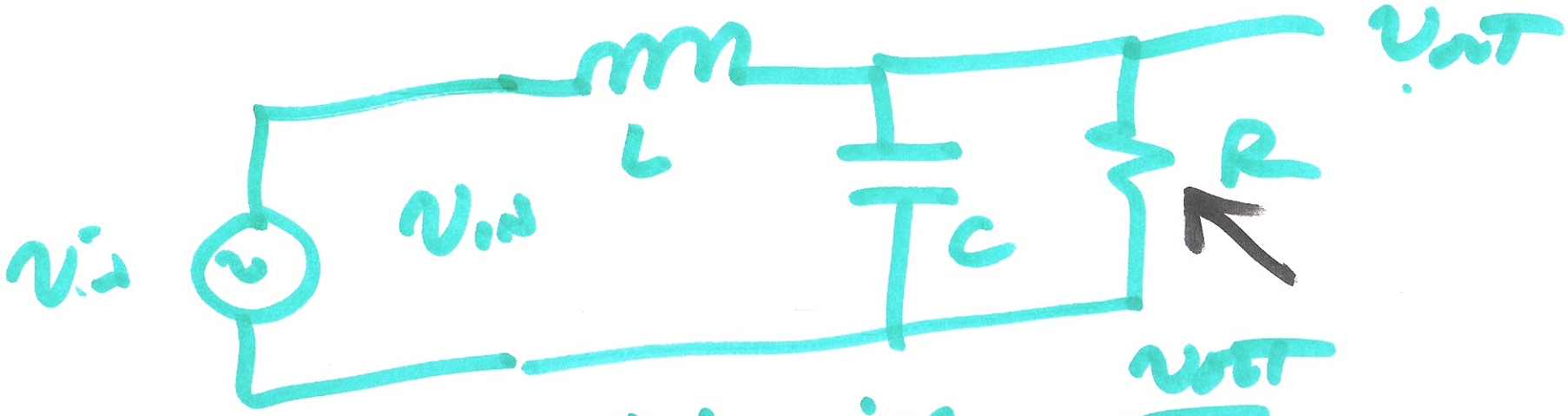
Simple questions



1) Derive & Sketch H & L responses

2) if v_{in} is 1V peak @ 200 Hz Sketch v_{out} & v_{in} on same plot.

1)



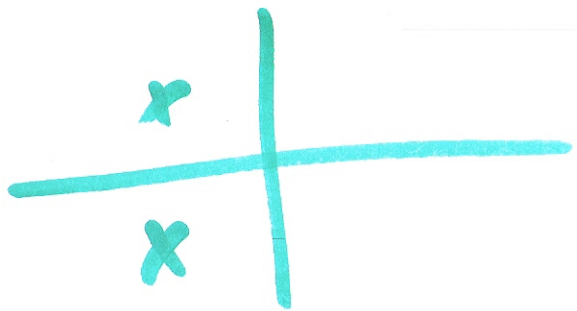
$\frac{v_{out}}{v_{in}}$

determine

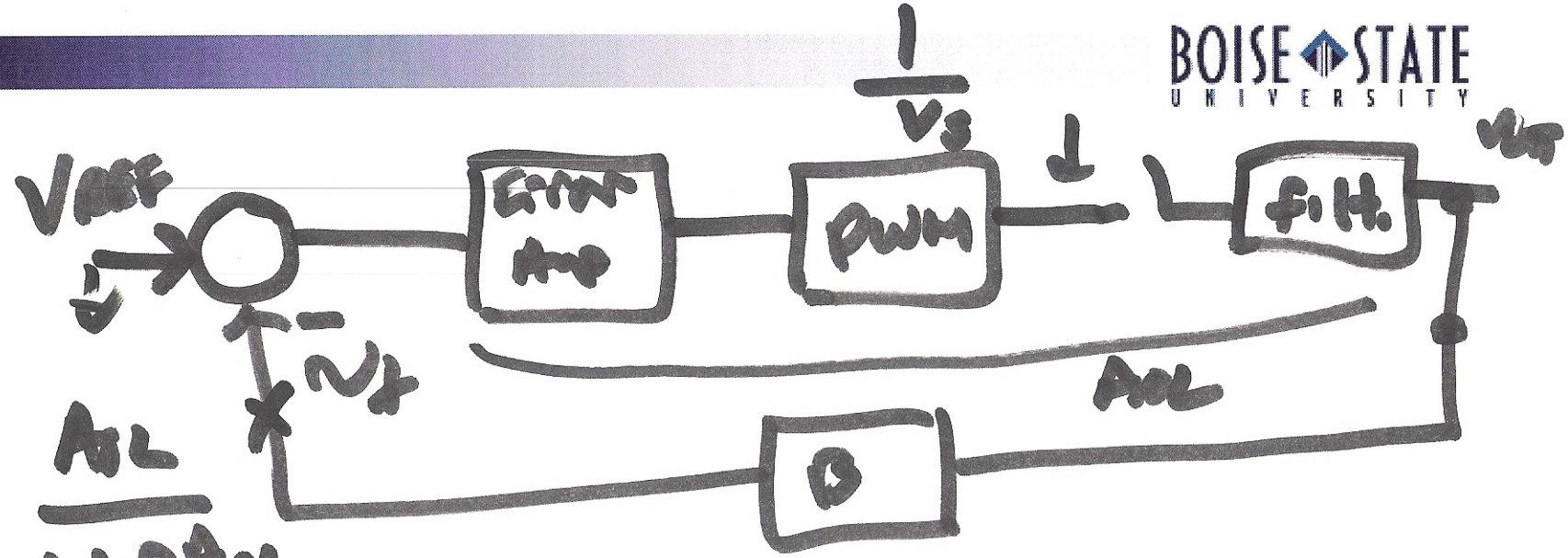
zero at DC

sketch | | ∠

sketch pole in complex plane



2)



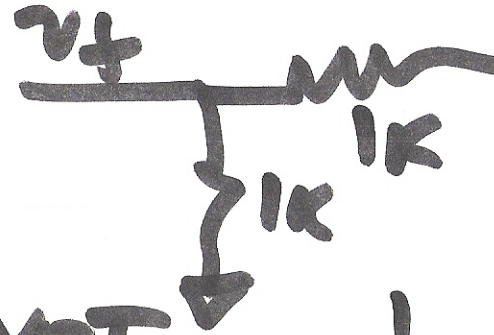
$$\frac{V_{OUT}}{V_{REF}} = \frac{A_{OL}}{1+\beta A_{OL}}$$

$$|\beta A_{OL}| = 1$$

$$\angle \beta A_{OL} = 180^\circ$$

$$\beta A_{OL} = -1$$

$V_f = V_{OUT}$

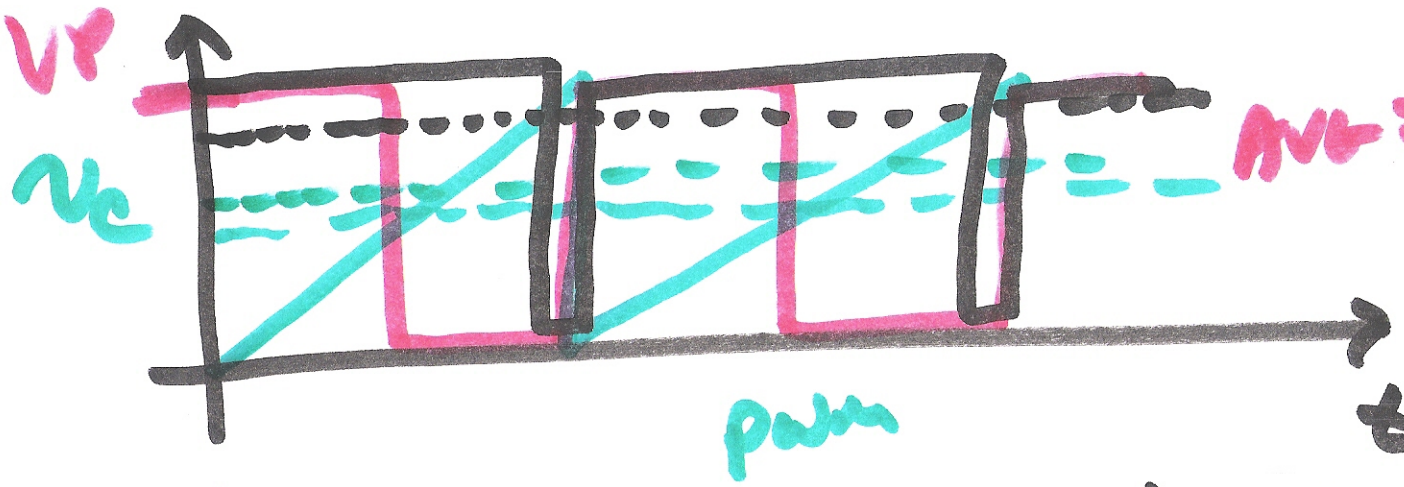


$$\frac{V_{OUT}}{V_{REF}} = \frac{1}{\frac{1}{A_{OL}} + \beta} \simeq \frac{1}{\beta}$$

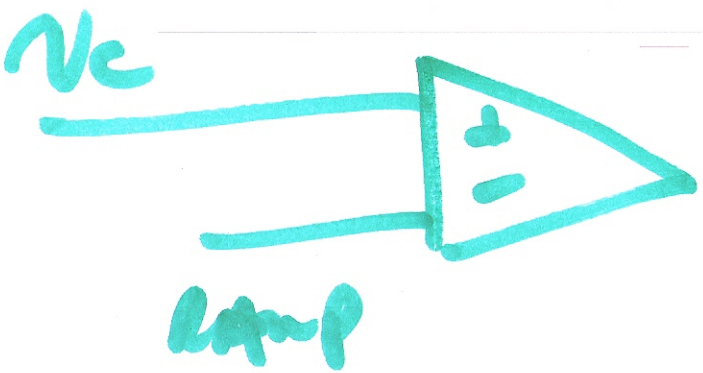
3)

$$\frac{d}{v_c} = \frac{1}{V_p} \qquad 0 < v_c < V_p$$

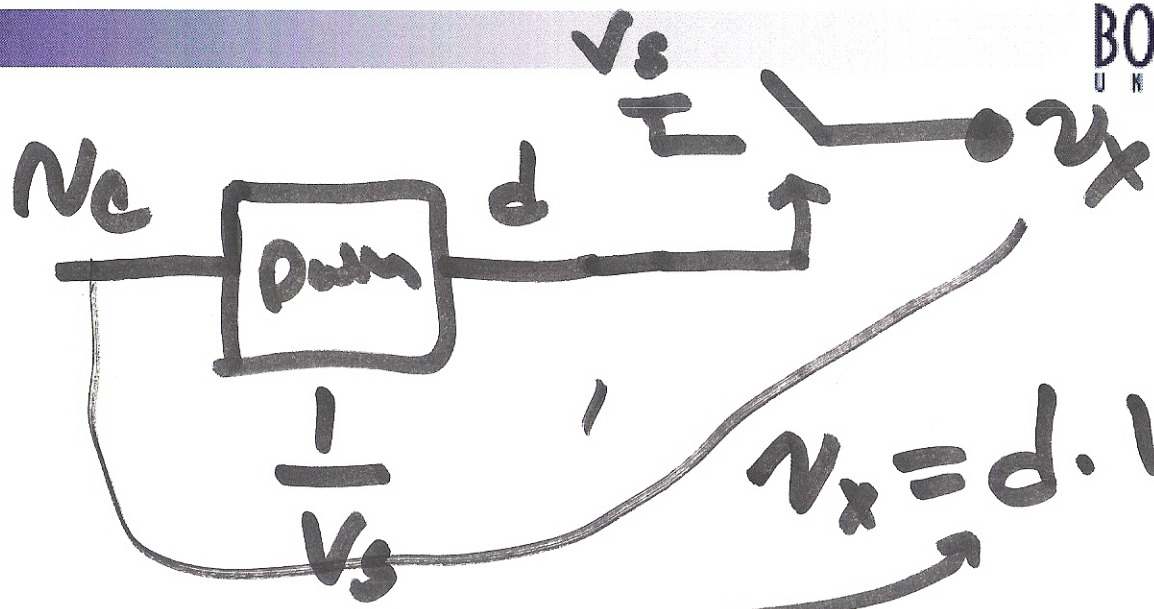
$d = \frac{1}{2} = 50\%$



$v_c \rightarrow V_p \quad d = 1$



4)

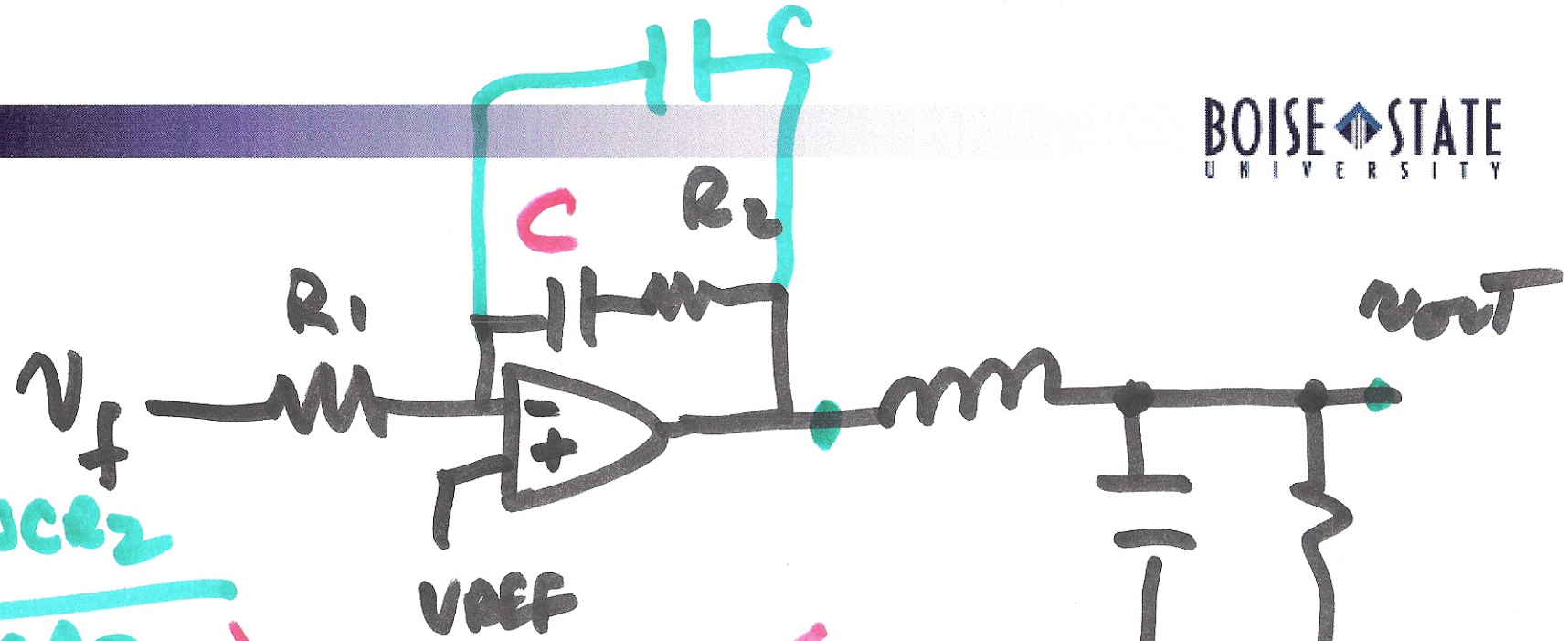


$$V_x = d \cdot V_s$$

$$\frac{d}{V_c} = \frac{1}{V_s}$$

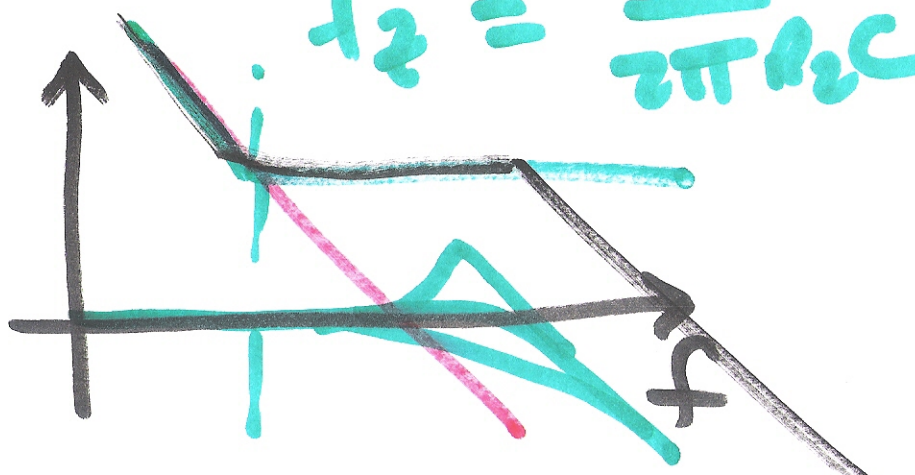
$$\boxed{V_x = V_c}$$

5)



$$\frac{1+j\omega CR_2}{0+j\omega CR_1} \cdot \left(-\frac{R_2+\frac{1}{j\omega C}}{R_1}\right) \cdot K_F$$

KNOW

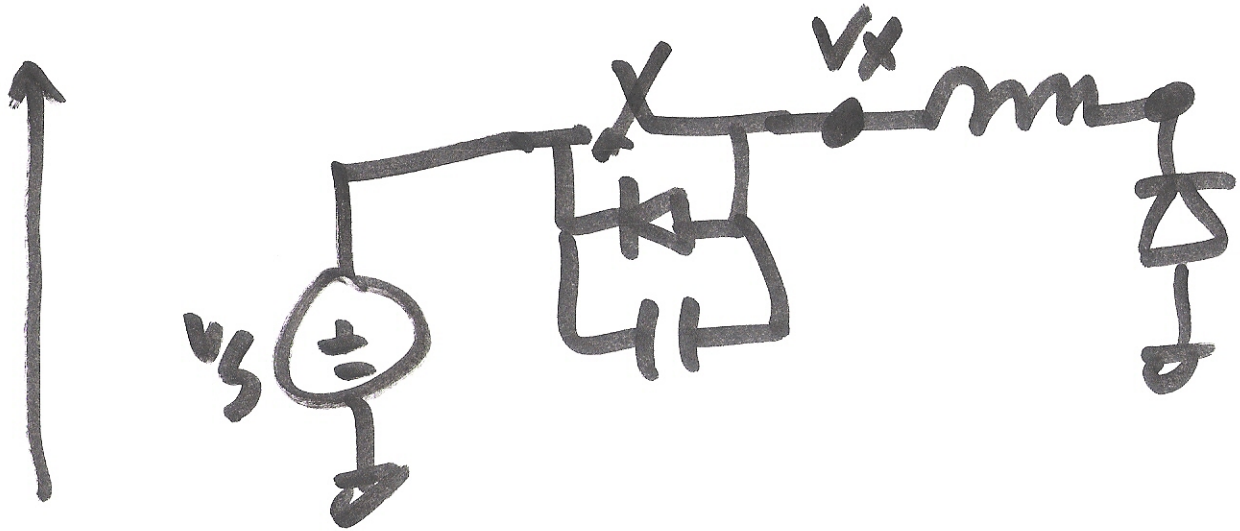


$$f_z = \frac{1}{2\pi R_2 C}$$

f

6)

Phase & Gain margin



ZVS & ZCS

switches turn on & off