EE 320

Lecture 4

2/3/14

TBE B310 H.W.

By 4:00 on 2/5

In my mailbox

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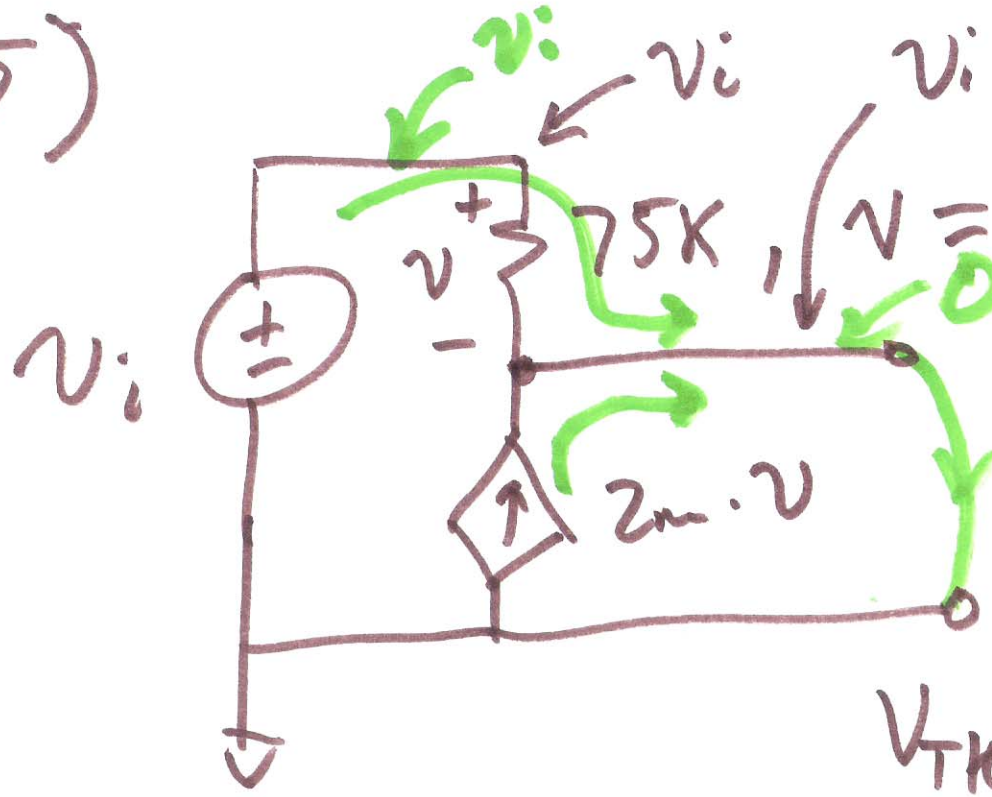
1.25)



$v = -(2m \cdot v) \cdot 75K$

$v = 0$

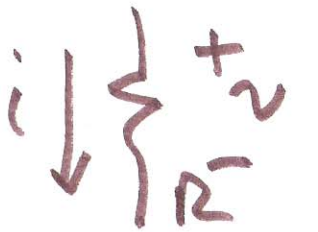
$i_{sc} = 2m\,v + \frac{v_i}{75K}$

$i_{sc} = v_i\left(2m + \frac{1}{75K}\right)$

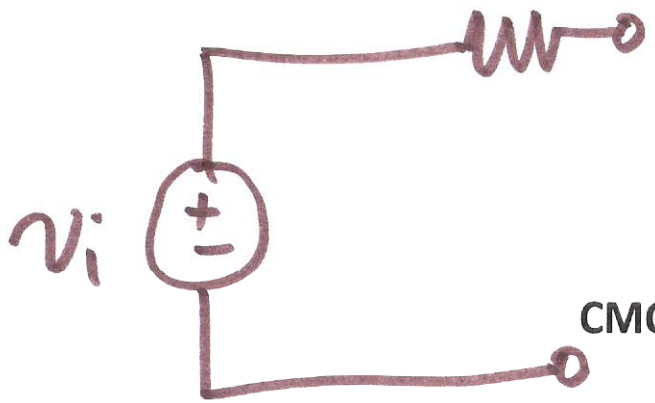
$V_{THN} = v_i = v_{oc}$

$R_{THN} = \frac{v_{oc}}{i_{sc}} = \frac{1}{2m + \frac{1}{75K}}$

$v = -iR$



$v = iR$



2)

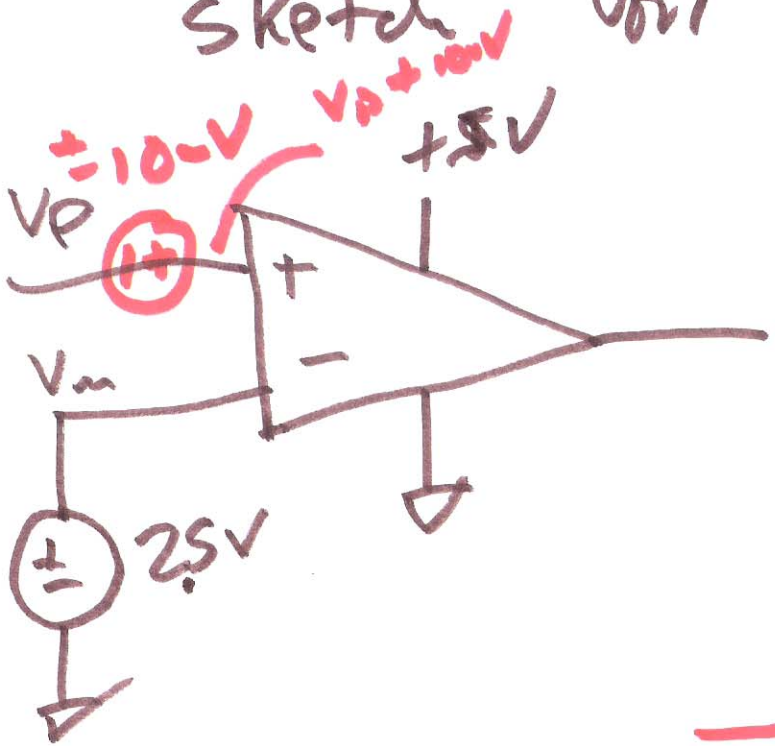
$A_{OL} = 500$, $V_{CC}^{+} = 5V$

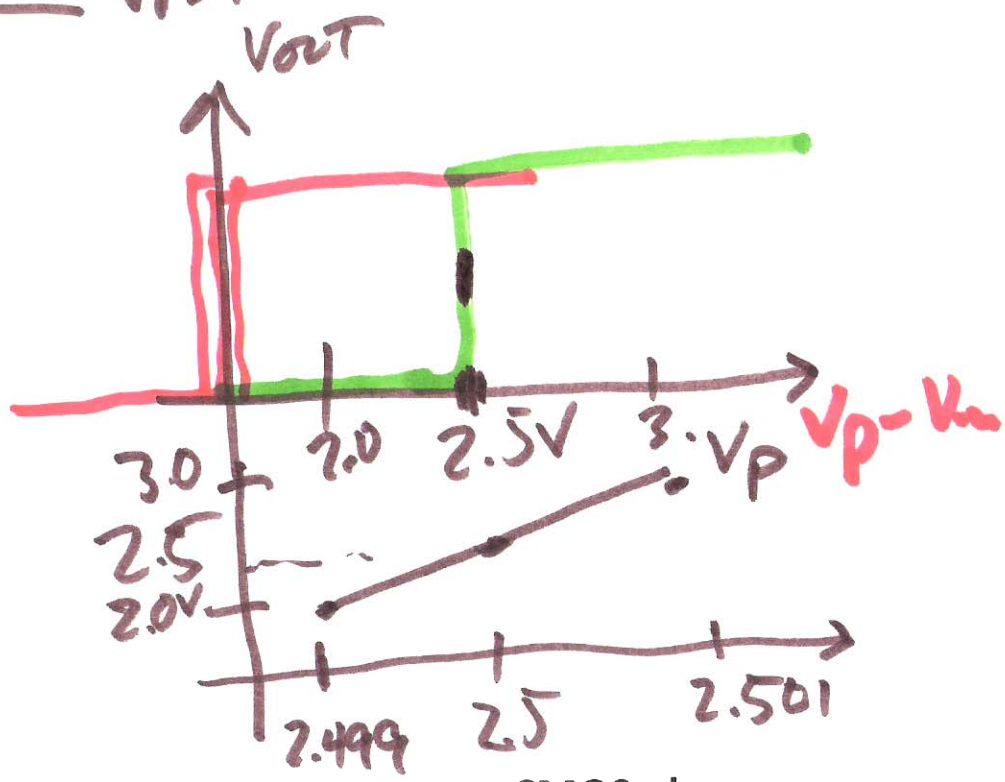
$V_{CC}^{-} = 0$

Sketch V_{OUT} vs. $V_p - V_m$

500 -1mV

$V_{OUT} = A_{OL}(V_p - V_m)$





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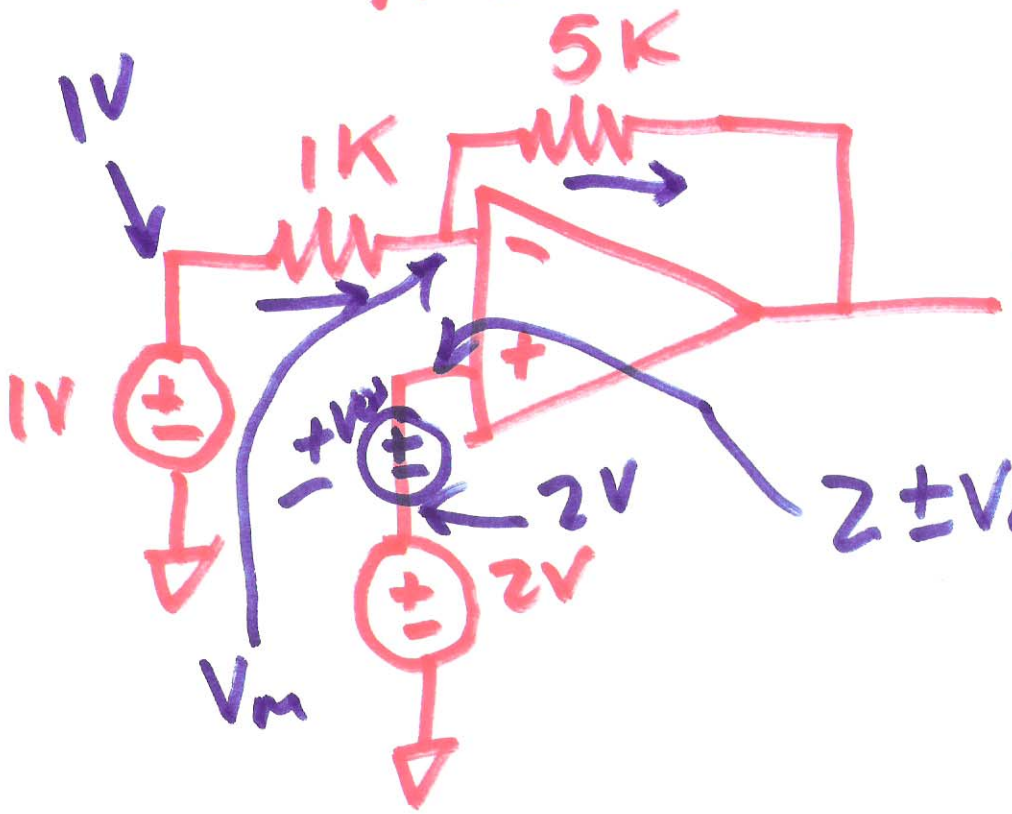
find V_{OUT} if $A_{OL} = 1{,}000$

$V_{OS} = \pm 10\text{-}V$



$$V_{OUT} = 10^3\left(2 \pm V_{OS} - V_m\right)$$

$$\frac{1 - V_m}{1K} = \frac{V_m - V_{OUT}}{5K}$$

$$5 - 5V_m = V_m - V_{OUT}$$

$$5 + V_{OUT} = 6V_m$$

$$V_m = \frac{5}{6} + \frac{V_{OUT}}{6}$$

$$V_{OUT} = 2{,}000 \pm 1{,}000 V_{OS}$$

$$-\frac{5000}{6} = \frac{1{,}000 V_{OUT}}{6}$$

$$V_{OUT}\left(\frac{6}{6} + \frac{1{,}000}{6}\right) = \frac{12{,}000}{6} - \frac{5{,}000}{6} \pm 1{,}000 V_{OS}$$

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4)

$V_{OUT}\ 1006 = 7{,}000 \pm 6000\ V_{OS}$

$$V_{OUT} = \frac{7 \pm 6\ V_{OS}}{1.006}$$

$V_{OS} = +10mV$, $V_{OUT} = \dfrac{7 + 60mV}{1.006}$

$= 7.0179V$

$V_{OUT} = \dfrac{7 - 60mV}{1.006}$

$= 6.9403$
$\quad\ 3986$

+20dB ×10 $V_{OS} = -10mV$
−20dB ÷10
+6dB ×2
−6dB ÷2
14dB ×5

1.2KHz

÷10) dec
×10

÷2 OCT
×2

5)

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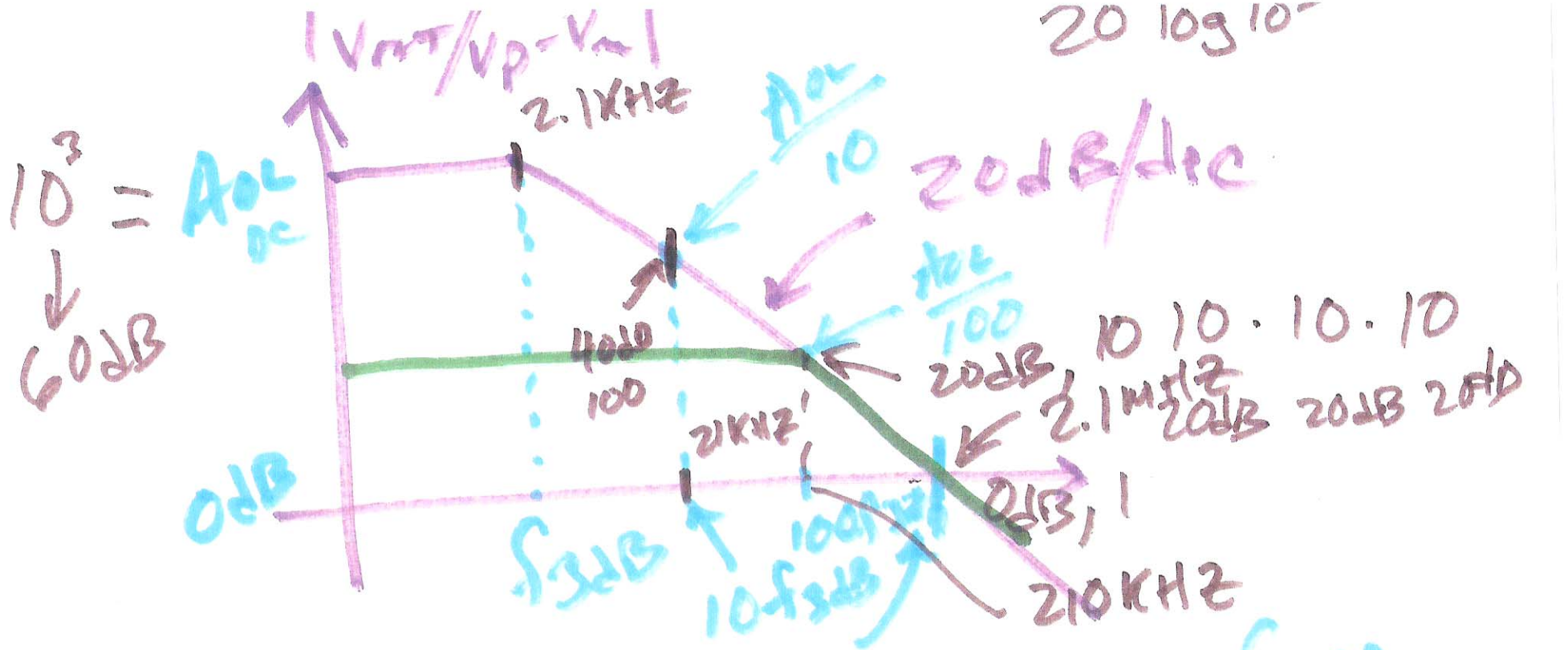
$$78 = \frac{t_d}{T} \cdot 360 \qquad T = \frac{1}{800} = 1.25\text{ms}$$

$$t_d = \frac{78}{360} \cdot 1.25\text{ms}$$

$$.27\text{ms}$$

4)



$$A_{OL}(f) = \frac{A_{OLDC}}{1 + j\frac{f}{f_{3dB}}}$$

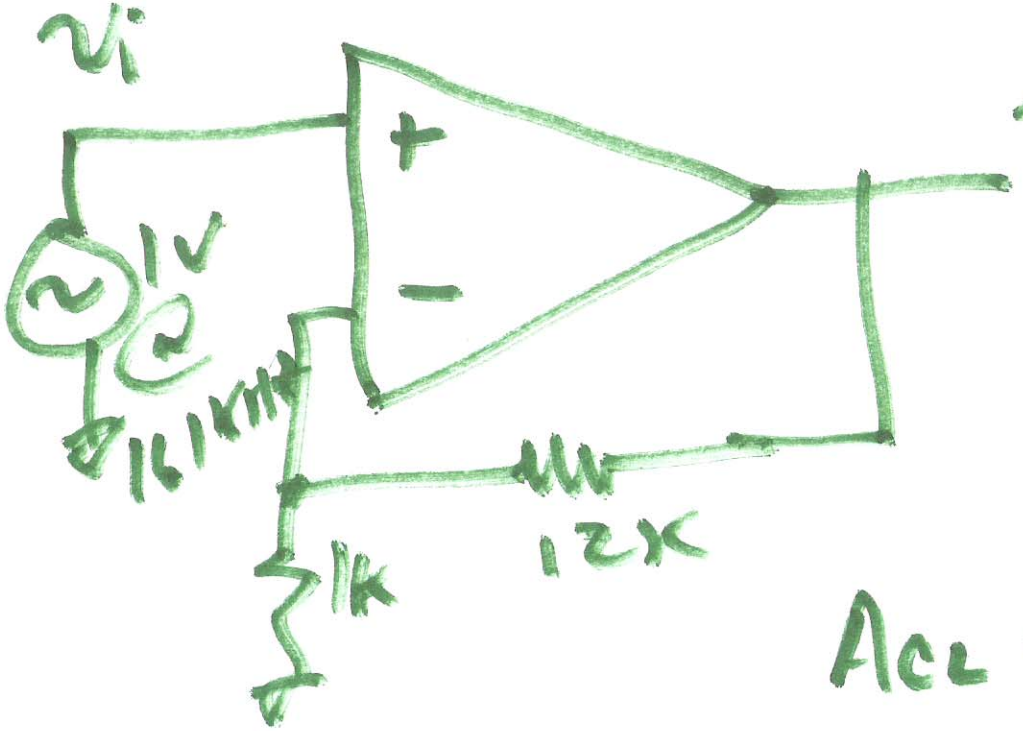
Unity-gain freq.

Gain. BW product

$210K \cdot 10 = 2.1MHz$

Op-Amp with $f_{UG} = 2.1\,MHz$ ← unity-gain BW

NON-INVERTING



$BW = ?$

$A_{CL} = 1 + \frac{12K}{1K}$

$= 13$

$A_{CL} \cdot f_{CL,BW} = 2.1\,MHz$

$161\,KHz = f_{CL,BW} = \frac{2.1\,MHz}{13}$

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