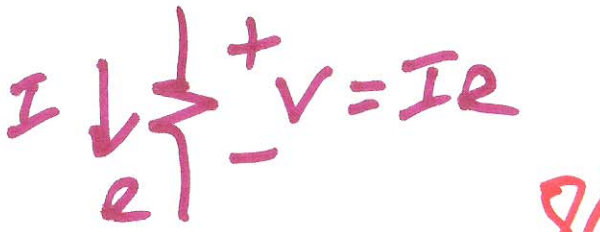
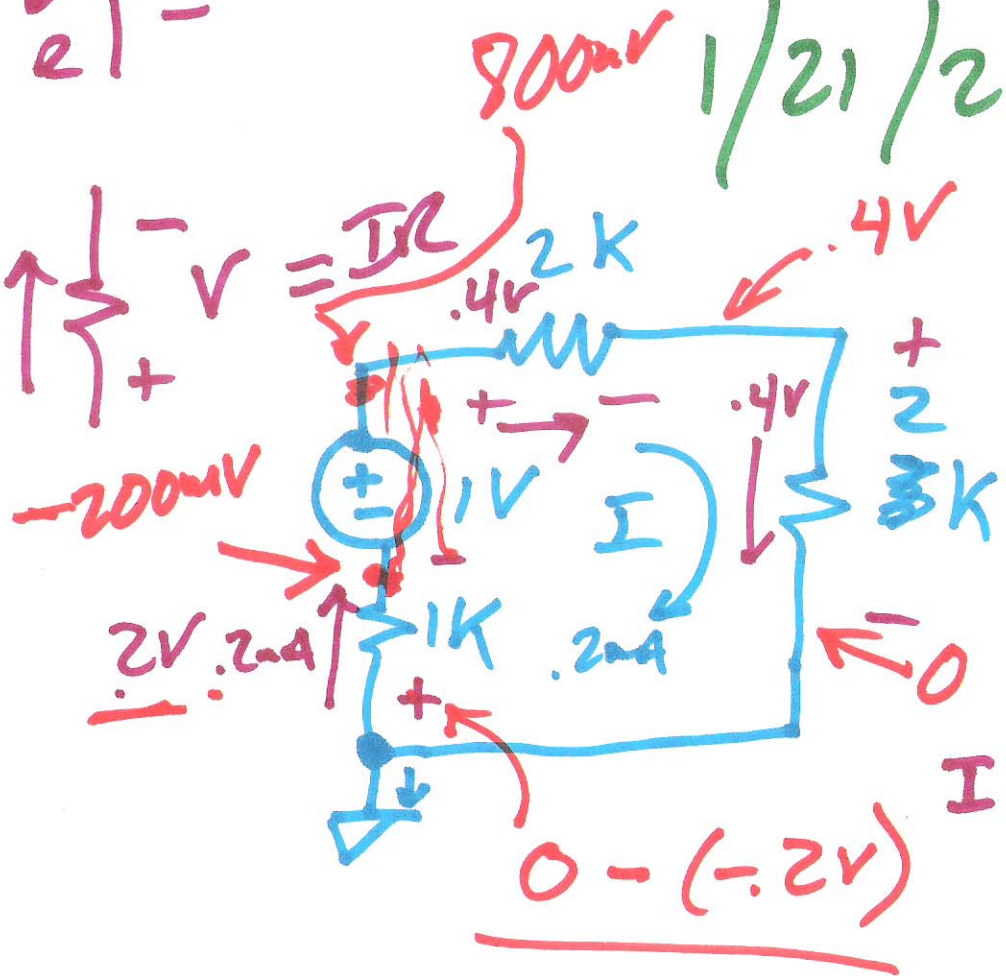
EE 320
Electronics I

1/21/2015

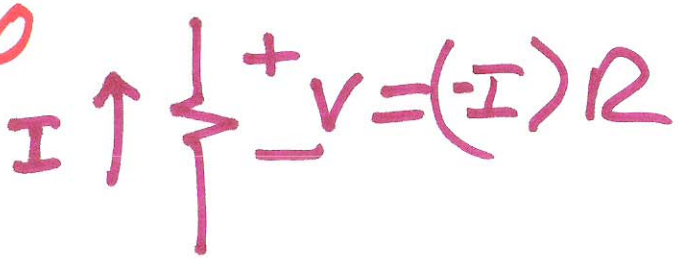
Lecture 1

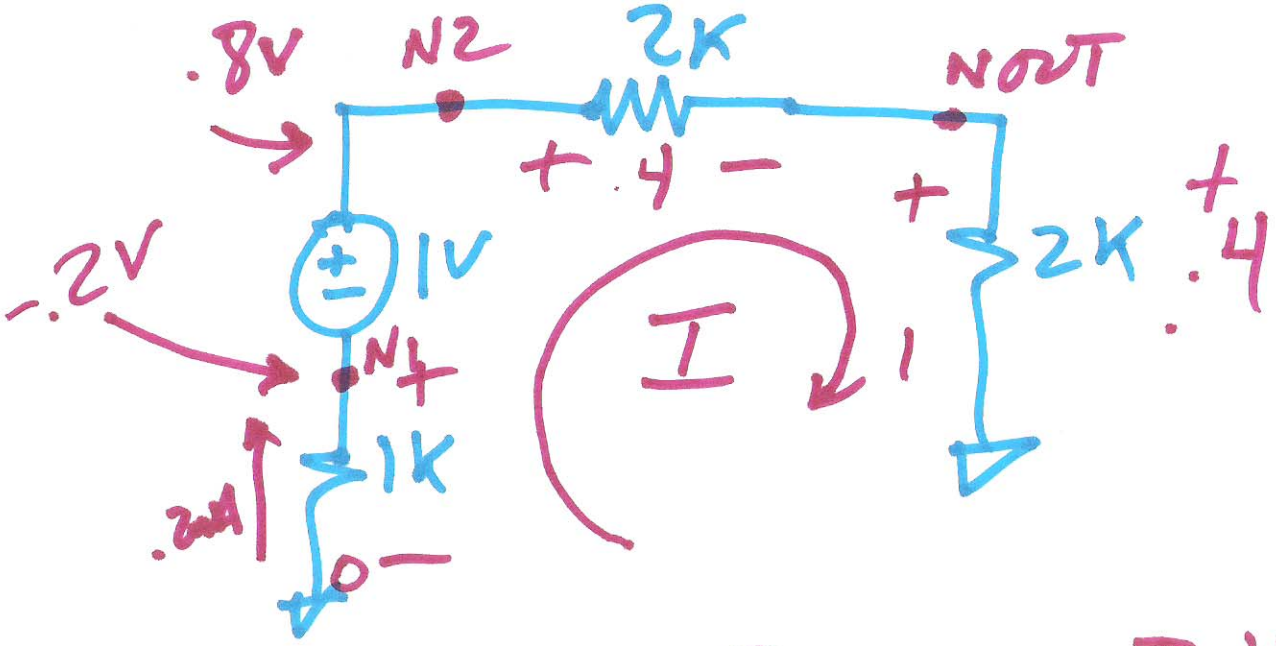


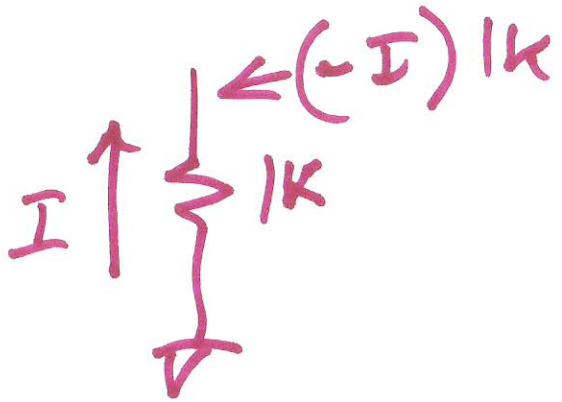


$$\frac{1V}{5K} = I = 200\mu A$$

$0.2\mu A$



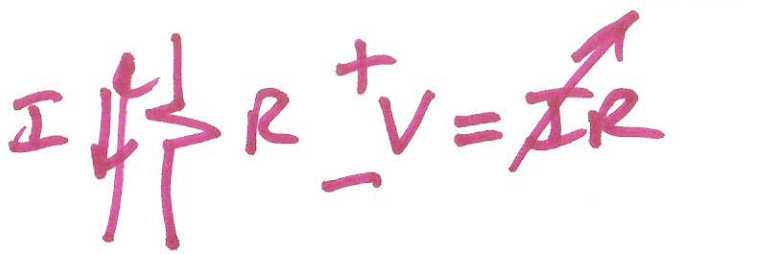


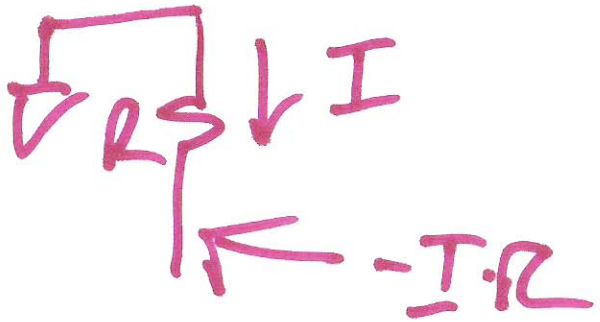


$-I \cdot 1k + 1 = 2kI + 2kI$

$-I \cdot 1k + 1 - 2kI - 2kI = 0$

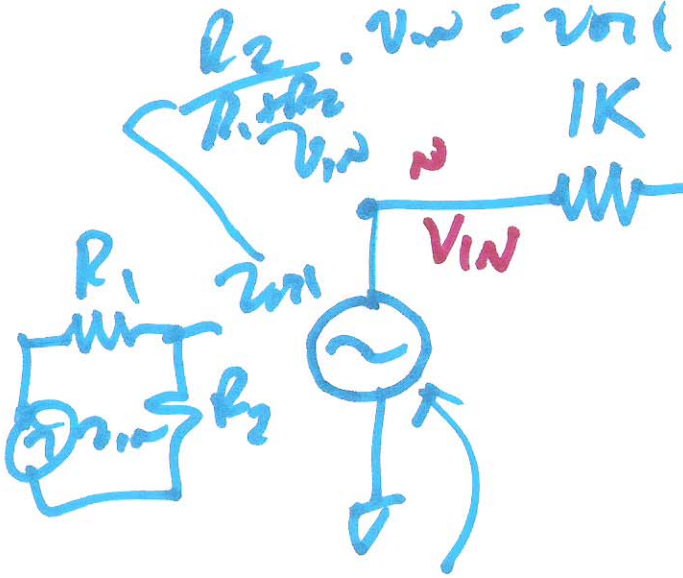
$I = 0.2\,mA$





My Sim

```
R1  N1  0     1K
R2  N2  NOUT  2K
R3  NOUT 0    2K
V1  N2  N1    DC 1
.tran 1
```



$$V_{OUT} = V_{IN} \cdot \frac{\frac{1}{j \cdot 2\pi \cdot 100 \cdot 2 \cdot 10^{-6}}}{1k + \frac{1}{j\,2\pi 100 \cdot 2 \cdot 10^{-6}}}$$

$$V_{IN} = \sin(2\pi \cdot 100 \cdot t)$$

$$\frac{V_{OUT}}{V_{IN}} = \frac{-j796}{1k - j796}$$

SIN 0 1 $\frac{1}{100}$ 100Hz

$2\pi \cdot 2 \cdot 10^{-4}$

$4\pi \cdot 10^{-4} = 1.25 \cdot 10^{-3}$ $\frac{1}{100} = 10ms$

$\rightarrow \frac{1}{1.25 \cdot 10^{-3}} = 796(-j)$

TITLE

VIN VIN 0 SIN 0 1 100

R1 VIN VOUT 1K

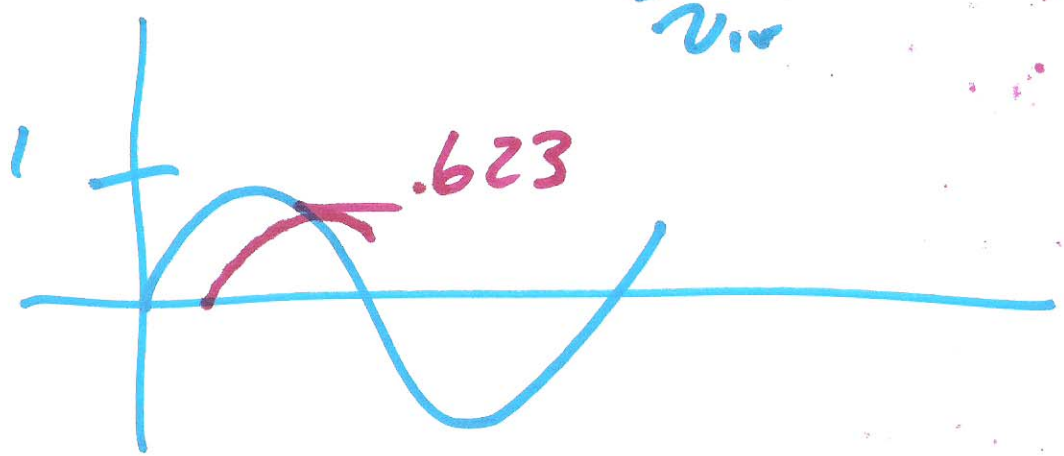
C1 VOUT 0 2u

.tran 40ms

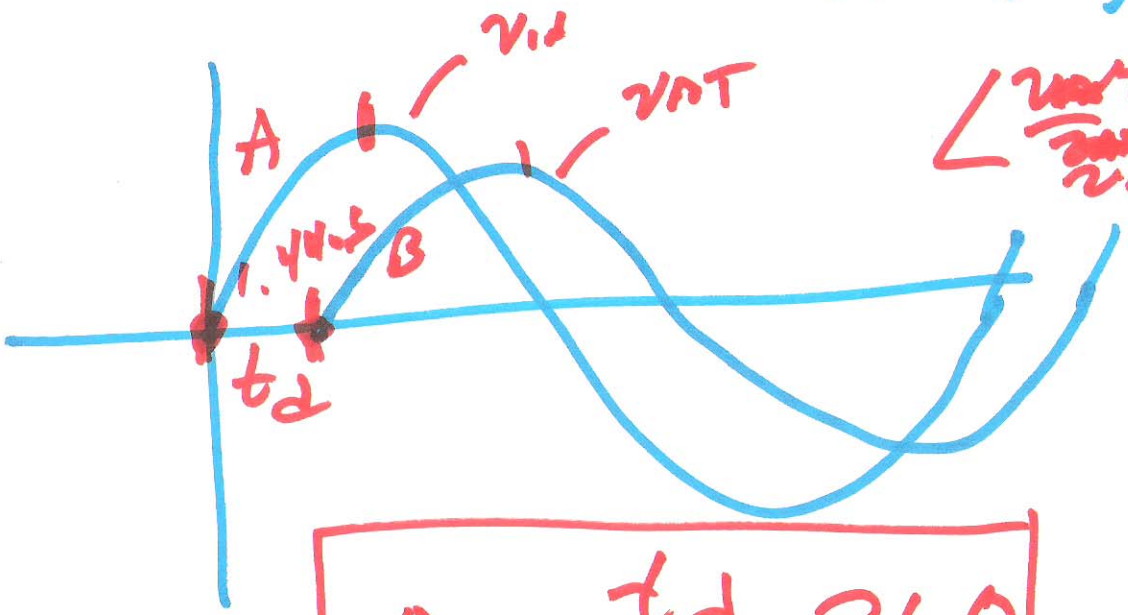
$$\frac{v_{out}}{v_{in}} = \frac{0 + j(-796)}{1k + j(-796)}$$

$$\left|\frac{v_{out}}{v_{in}}\right| = \frac{\sqrt{0^2 + (796)^2}}{\sqrt{(10^3)^2 + (796)^2}} = \frac{796}{1278}$$

$$\frac{v_{out}}{v_{in}} = .623$$



$$\frac{v_{OUT}}{v_{in}} = \frac{0 + j(-796)}{1k + j(-796)}$$



$$\angle \frac{v_{OUT}}{v_{in}} = -45°$$

$$\angle \frac{v_{in}}{v_{OUT}} = +45$$

$$\theta = \frac{t_d}{T} \cdot 360$$

1.44ms

$$52 = \frac{t_d}{10ms} \cdot 360$$

t_d

$\angle 90$

$\tan^{-1} \frac{-796}{0}$

$$- \tan^{-1} \frac{-796}{1k}$$

$$\frac{\angle 90}{\angle 38.5°} = \angle 90 - \angle 38.5$$

$$- \angle 52°$$