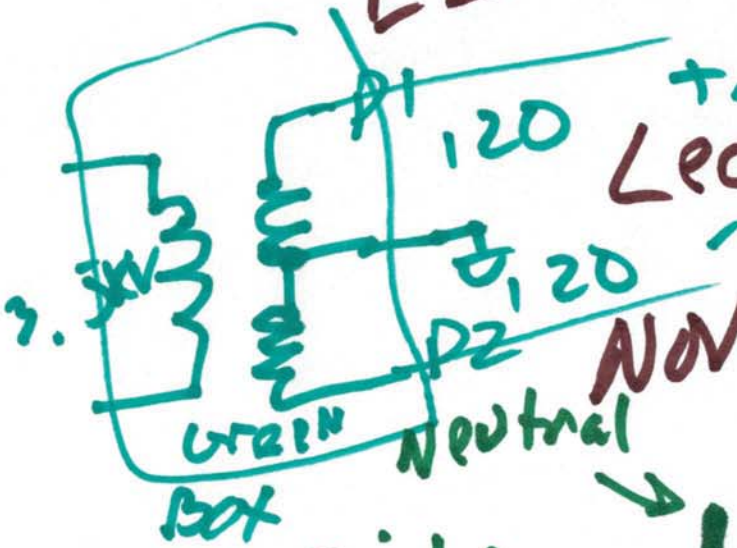
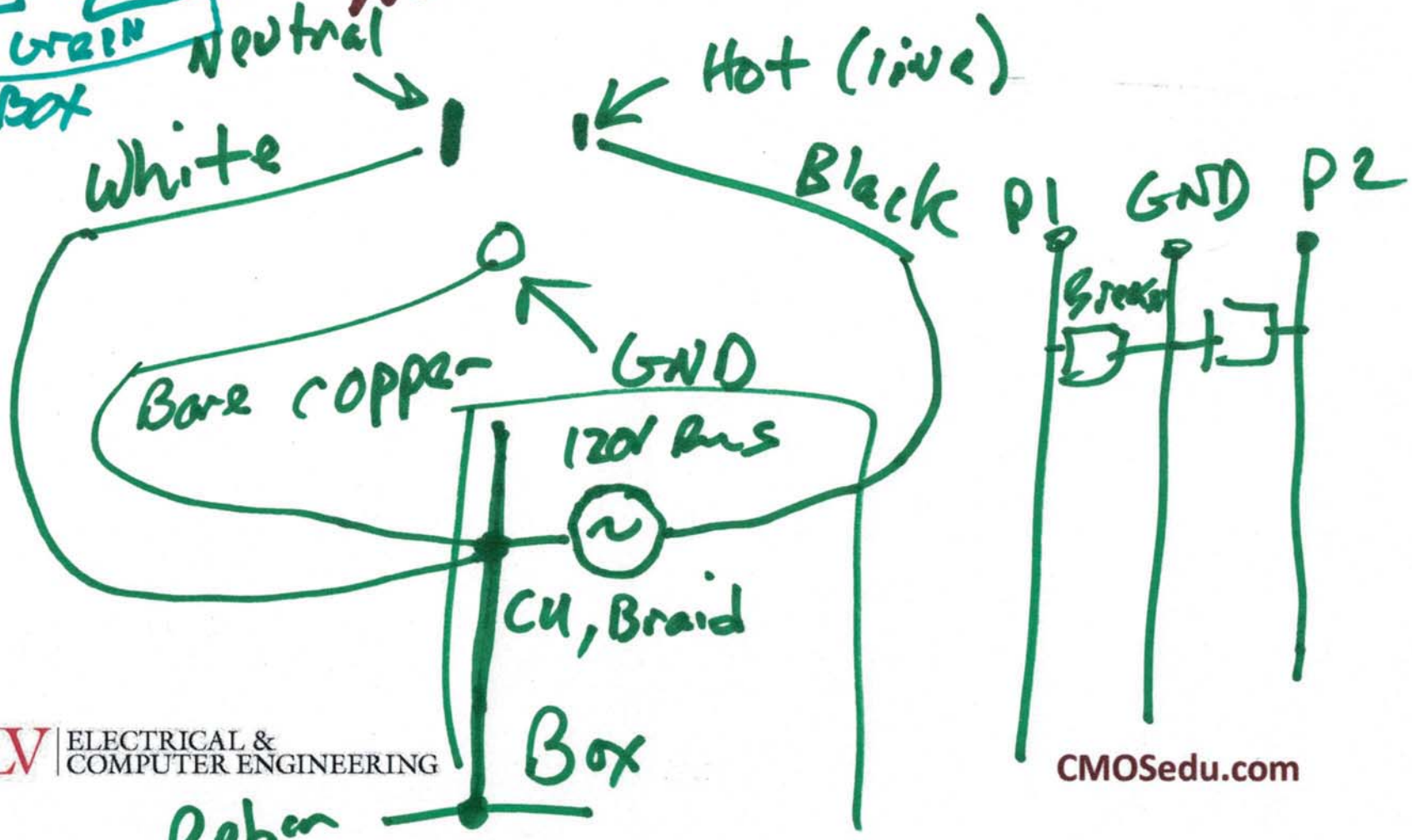
EE 220 circuits 1

Lecture 25

Nov. 26, 2018





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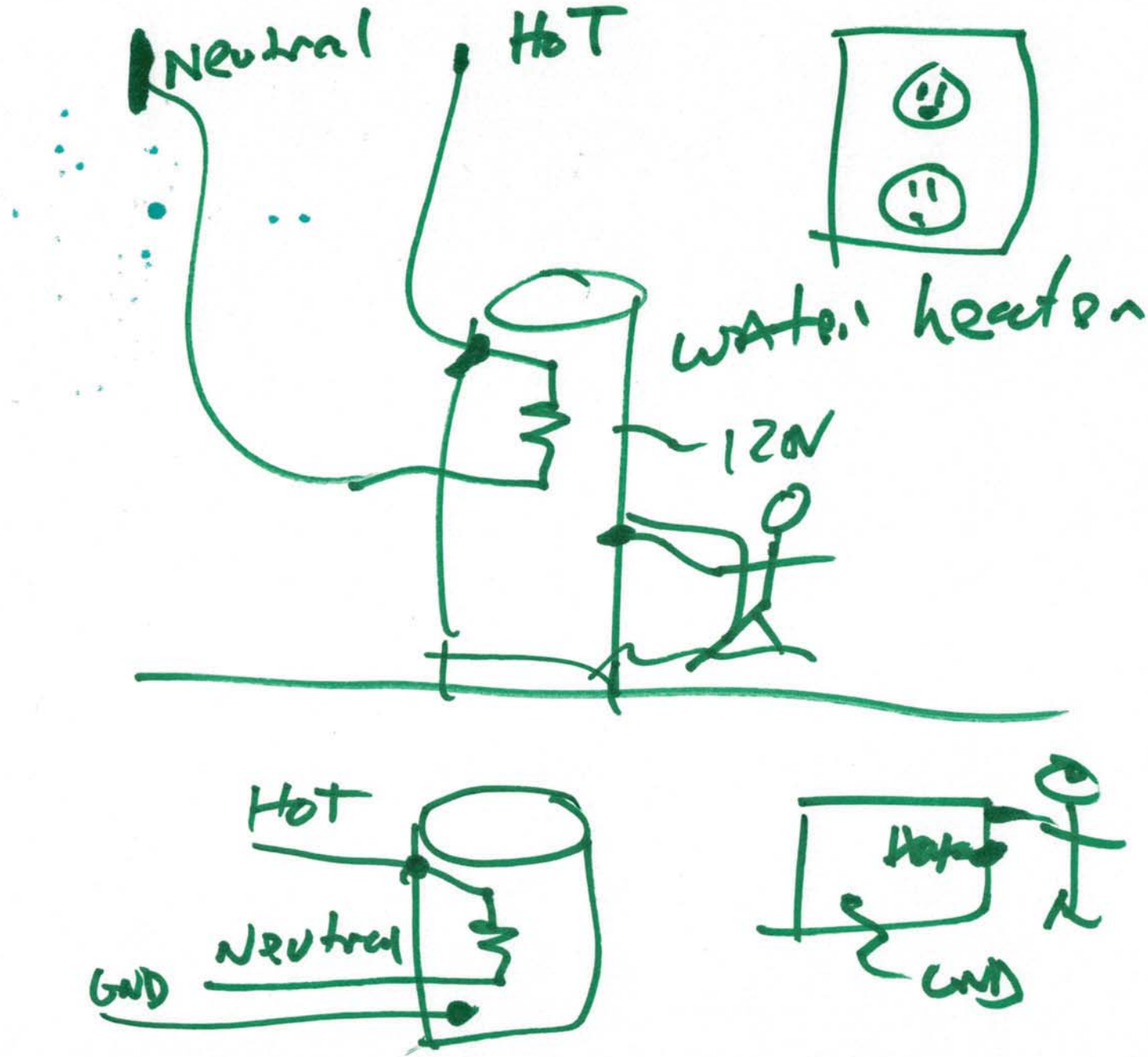
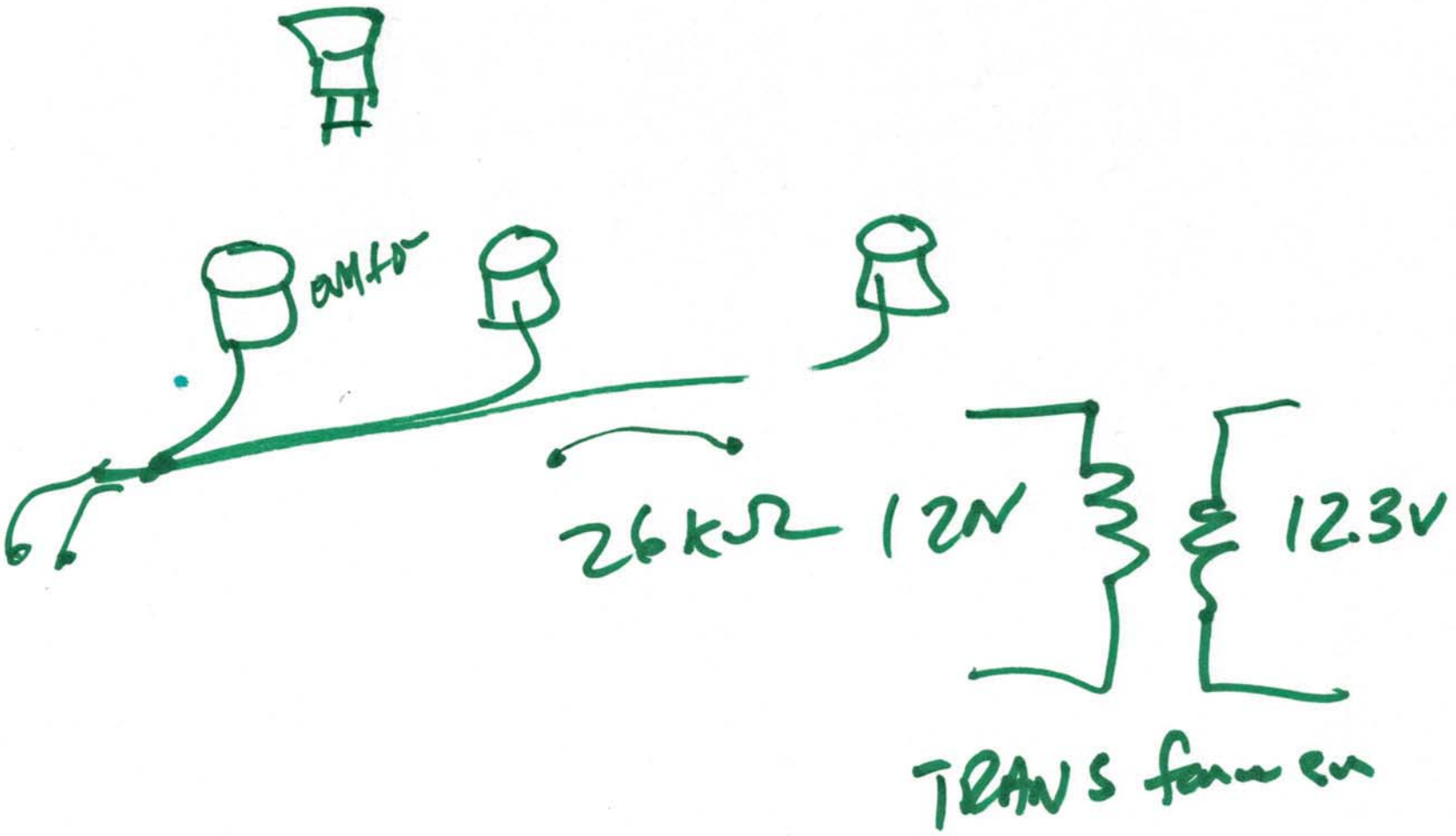
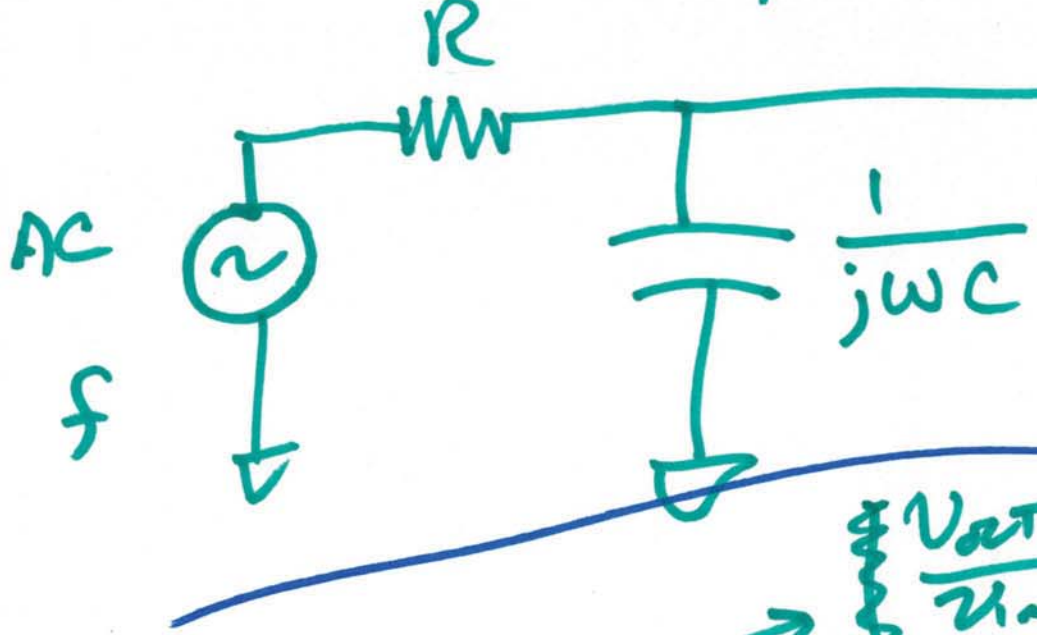
1)


Neutral
Hot
water heater
120V
Hot
Neutral
GND
Hot
GND


26kΩ
12V
12.3V
TRANSformer

frequency response



$$v_{out} = v_{in} \cdot \frac{\frac{1}{jwC}}{\frac{1}{jwC} + R}$$

$$\left\{\frac{v_{out}}{v_{in}}\right\} = \frac{1 + j0}{1 + jwRC}$$

$$\Rightarrow \left|\frac{v_{out}}{v_{in}}\right| = \frac{\sqrt{1^2 + 0^2}}{\sqrt{1^2 + (2\pi f RC)^2}}$$

$$= \frac{1}{\sqrt{1 + \left(\frac{f}{x}\right)^2}}$$

$$x = \frac{1}{2\pi RC}$$

LO

$\angle \tan^{-1} \frac{2\pi fRC}{1}$ transfer function

$20 \log \frac{1}{\sqrt{2}} = 20 \log .707 =$

$-3dB$

$\angle -\tan^{-1} 2\pi fRC$

y-AXIS IN dB = $20 \log \frac{V_{out}}{V_{in}}$

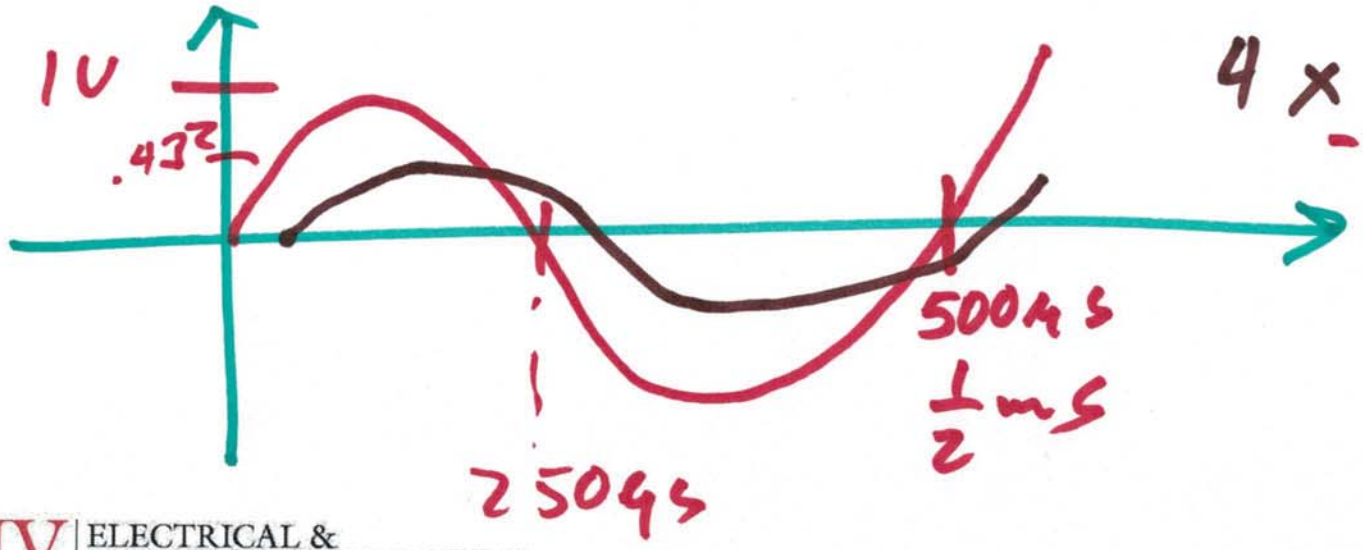
$\left|\frac{V_{out}}{V_{in}}\right| = -7\,dB$ $f = 2KHz$

$\angle \frac{V_{out}}{V_{in}} = -15°$

$V_{in} = 1$

$V_{in} = 1$ $\quad -7 = 20 \log \frac{V_{out}}{1}$, $V_{out} = 1 \cdot 10^{-7/20}$

$= .446$



$4 \times -15° = \frac{t_d}{500\mu} \cdot 360$

$t_d = 20.83\,\mu s \times 4$