

MAE 140 HW #1

1/19

$$P = 0.5 \text{ W}$$

$$V = 9 \text{ V}$$

$$P = v i$$

$$0.5 = 9 i$$

$$i \approx 0.0556 \text{ A}$$

$$(55.6 \text{ mA}) //$$

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1	delivering	$ P = 15$	$P = 15$
2	absorbing	5	-5
3	absorbing	20	-20
4	absorbing	10	-10
5	delivering	60	60
6	absorbing	40	-40

(I flipped all the signs just to add to the confusion)

$$\therefore \sum P = 0 \text{ W}$$

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$$PR_{dB} = 10 \log_{10} \left(\frac{1.1 \times 4.5 \times 10^{-3}}{6.5 \times 7 \times 10^{-9}} \right)$$

$$\approx 50.366 \text{ dB} //$$

2/4

$$P = 25 \times 10^{-3} \text{ W} = 15 i$$

$$= 15 \times \frac{15}{R_x}$$

$$\Rightarrow R_x = \frac{225}{0.025}$$

$$R_x = 9 \text{ k}\Omega //$$

2/9

$$R = 10 \text{ k}\Omega = 10^4 \Omega$$

$$P = \frac{1}{8} \text{ W} = v i$$

$$= \frac{v^2}{10^4}$$

$$= 35.355 \text{ V} //$$

2/12

$$i_2 = -10 \text{ mA}$$

$$i_4 = 20 \text{ mA}$$

$$i_3 = i_4 = 20 \text{ mA} //$$

$$i_1 + i_2 + i_4 = 0$$

$$\Rightarrow i_1 = -10 \text{ mA} //$$

2/17 $i_2 = 10 \text{ mA}$, $i_3 = -15 \text{ mA}$, $i_4 = 5 \text{ mA}$

$$i_1 - i_2 + i_3 - i_4 = 0$$

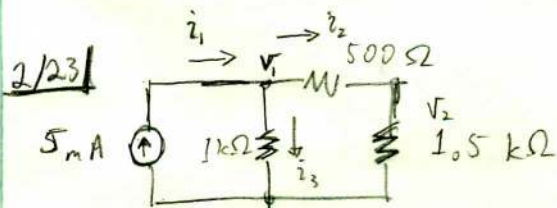
$$i_1 - 10 - 15 - 5 = 0$$

$$i_1 = 30 \text{ mA} //$$

$$-i_1 + i_2 - i_5 = 0$$

$$-30 + 10 - i_5 = 0$$

$$i_5 = -20 \text{ mA} //$$



$$i_1 = 5 \text{ mA} = i_2 + i_3$$

$$= \frac{V_1}{10^3} + \frac{V_1}{2 \times 10^3}$$

$$10 = 3V \Rightarrow V = 10/3$$

Voltage divider: $V_2 = \frac{1.5 V_1}{2}$

$$= \frac{3}{2} \times \frac{5}{3} = 2.5 \text{ V}$$

$$V = IR$$

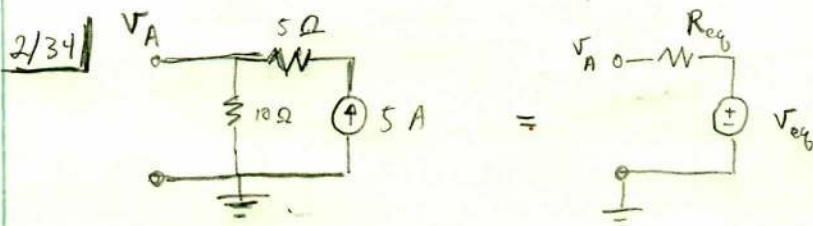
$$i_2 = \frac{2.5 \text{ V}}{1.5 \times 10^3 \Omega} = 1.667 \text{ mA}$$

$$P = IV = 1.667 \text{ mA} \cdot 2.5 \text{ V} = 4.167 \text{ mW} //$$

2/27 $75 + (300 \parallel (100 + 200)) = 75 + \frac{90000}{300 + 300}$

$$= 75 + 150$$

$$= 225 \Omega //$$



$$\Rightarrow \begin{cases} V_{eq} = 50 \text{ V} \\ R_{eq} = 10 \Omega \end{cases} //$$