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Mid-Term Prep

Chapter 1-5 Equations

$$\Delta V = -IR$$

$$\frac{1}{R_P} = \frac{1}{R_1} + \frac{1}{R_2} + \ldots$$

$$R_S = R_1 + R_2 + \ldots$$

$$P = IV$$

$$\Delta v_C = -Q/C$$

$$C_p = C_1 + C_2 + \ldots$$

$$\frac{1}{C_S} = \frac{1}{C_1} + \frac{1}{C_2} + \ldots$$

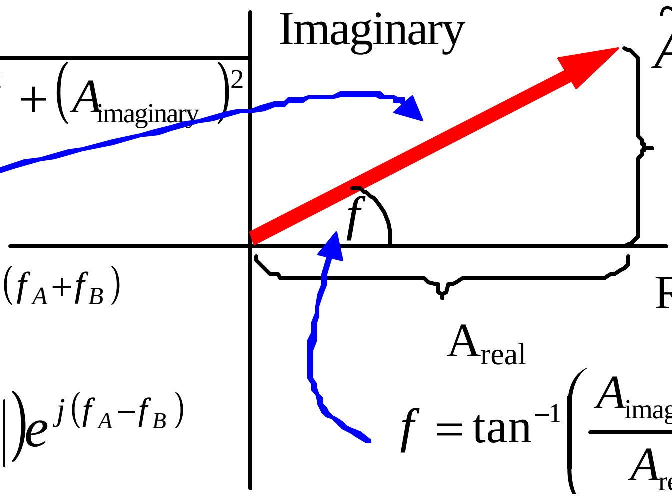
$$dv_C/dt = -i/C$$

$$t_{RC} = RC$$

$$j = \sqrt{-1}$$

$$\Delta\tilde{v} = -\tilde{i}\,\tilde{Z}$$

$$|A| = \sqrt{(A_{\text{real}})^2 + (A_{\text{imaginary}})^2}$$

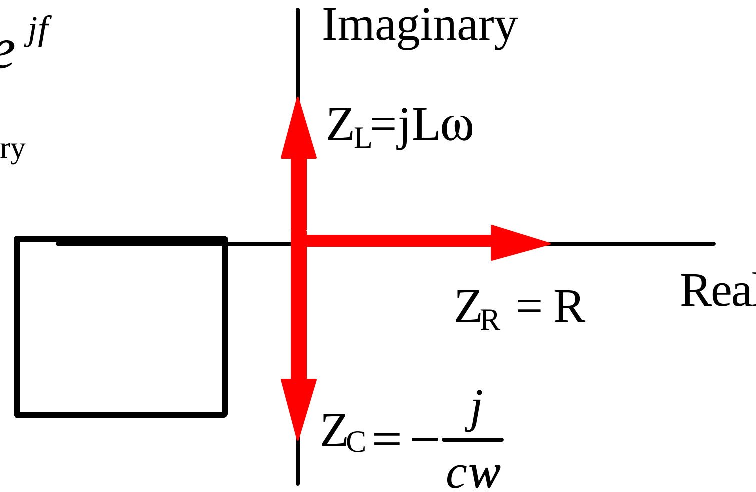


$$\tilde{A} = |A|e^{jf}$$

$$f = \tan^{-1}\left(\frac{A_{\text{imaginary}}}{A_{\text{real}}}\right)$$

$$\tilde{A}\tilde{B} = |A||B|e^{j(f_A + f_B)}$$

$$\tilde{A}/\tilde{B} = (|A|/|B|)e^{j(f_A - f_B)}$$



$$Z_L = jL\omega$$

$$Z_R = R$$

$$Z_C = -\frac{j}{cw}$$

$$\Delta V \approx \frac{i}{C \cdot f}$$

$$r = \frac{\Delta V}{V_{DC}}$$

$$V_p = \sqrt{2} \cdot V_{rms}$$

$$\frac{Z_s}{Z_p} = \left(\frac{N_s}{N_p}\right)^2$$

$$P_p \approx P_s$$

$$\frac{v_s}{v_p} = \frac{N_s}{N_p}$$

$$I_B = I_E - I_C$$

$$I_C = bI_B$$

$$V_E = V_B - 0.6\ \text{V}$$

Mid-Term Prep

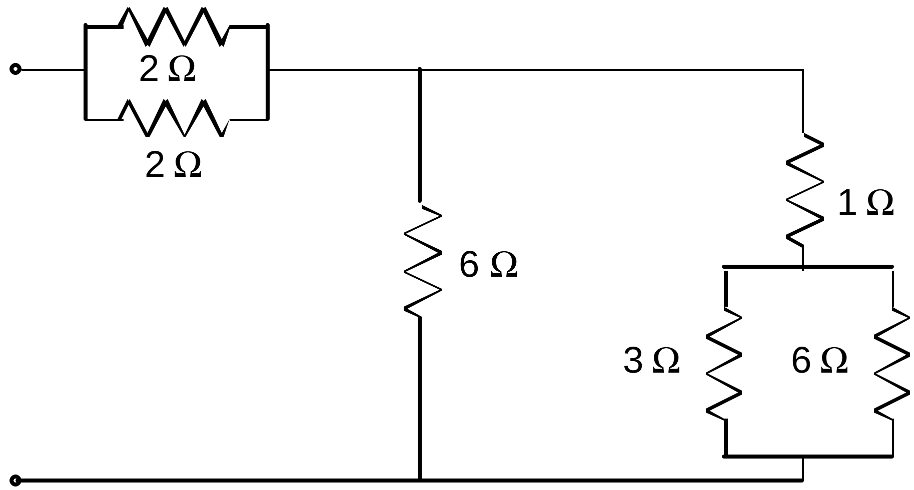
Chapter 1

$$\Delta V = -IR\left[1\ \mathrm{V} = 1\ \mathrm{A}\cdot\Omega\right]$$

$$P = IV\left[1\ \mathrm{W} = 1\ \mathrm{A}\cdot\mathrm{V}\right]$$

$$\frac{1}{R_P} = \frac{1}{R_1} + \frac{1}{R_2} + \ldots$$

$$R_S = R_1 + R_2 + \ldots$$



- Reduce the combination of resistors shown in the circuit above to a single equivalent resistor.
- Calculate the current through the 3-Ω resistor and the voltage across the 1-Ω resistor when a 120-V source is attached across the terminals.

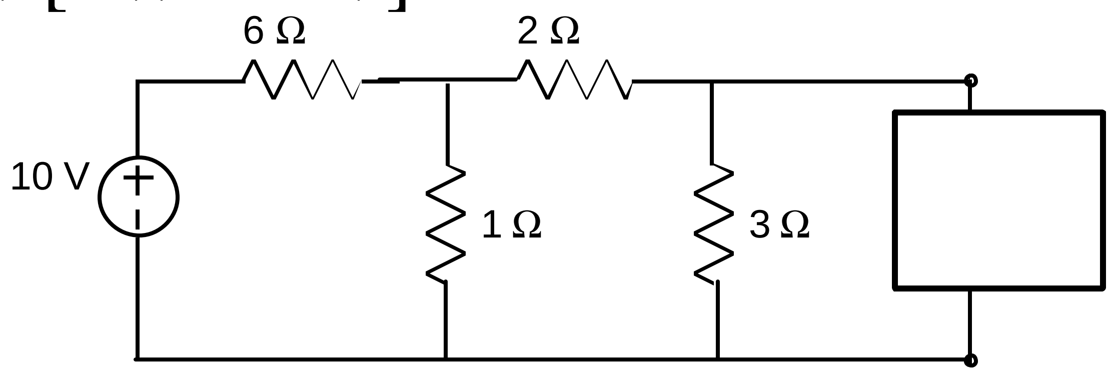
Mid-Term Prep

Chapter 1

$$\Delta V = -IR \left[1\,\mathrm{V} = 1\,\mathrm{A}\cdot\Omega\right]$$

$$P = IV \left[1\,\mathrm{W} = 1\,\mathrm{A}\cdot\mathrm{V}\right]$$

$$\frac{1}{R_P} = \frac{1}{R_1} + \frac{1}{R_2} + \ldots \qquad R_S = R_1 + R_2 + \ldots$$



- Replace the network to the left of the slot by its Thévenin equivalent circuit.
- If a 10-Ω resistor is inserted in the slot, calculate the current through it.

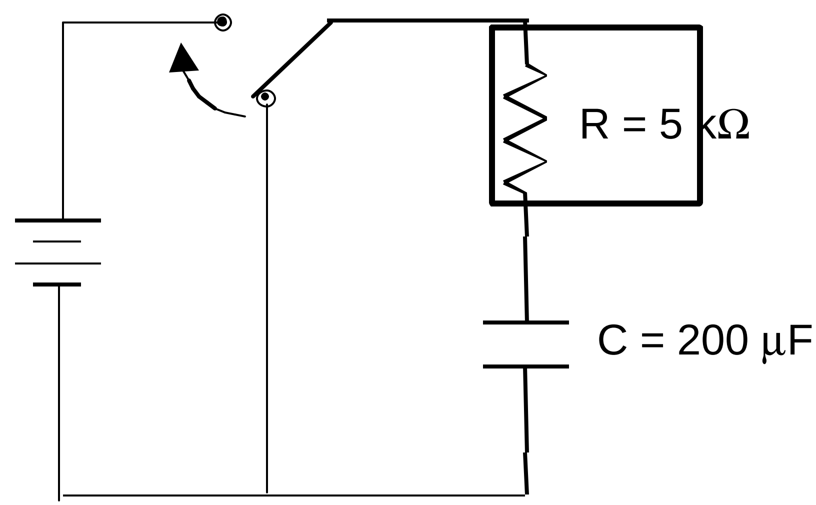
Mid-Term Prep
Chapter 2

$$\Delta v_C = -Q/\mathrm{C}\,[1\,\mathrm{V} = 1\,\mathrm{C/F}]$$

$$C_p = C_1 + C_2 + C_3 + \ldots$$

$$1/C_S = 1/C_1 + 1/C_2 + 1/C_3 + \ldots$$

$$dv_C/dt = -i/C \qquad t_{RC} = RC\ [1\ \mathrm{s} = 1\ \Omega\cdot F]$$



- Determine the initial current through the resistor just after the switch is flipped.
- Determine the voltage across the capacitor 3 s after the switch is flipped.

Mid-Term Prep

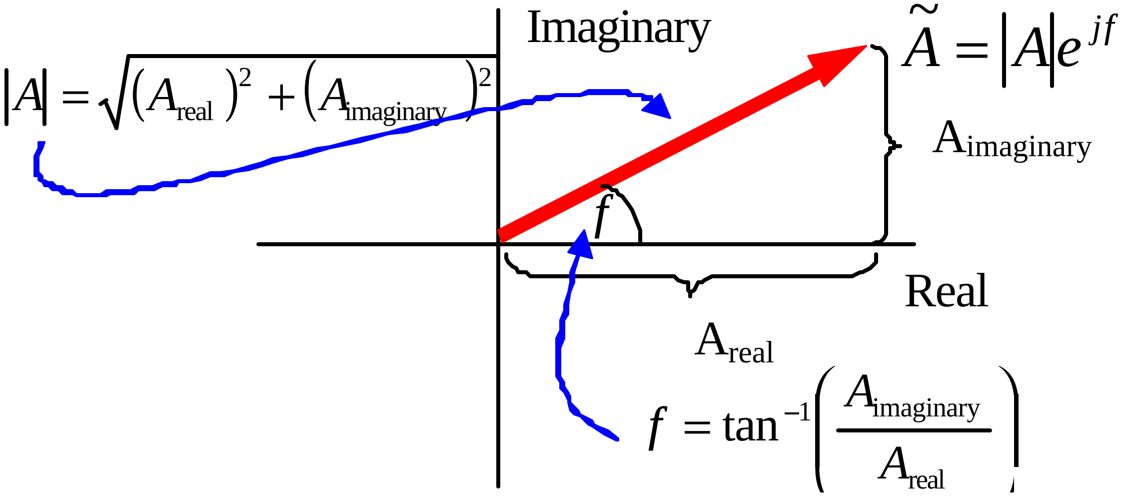
Chapter 3

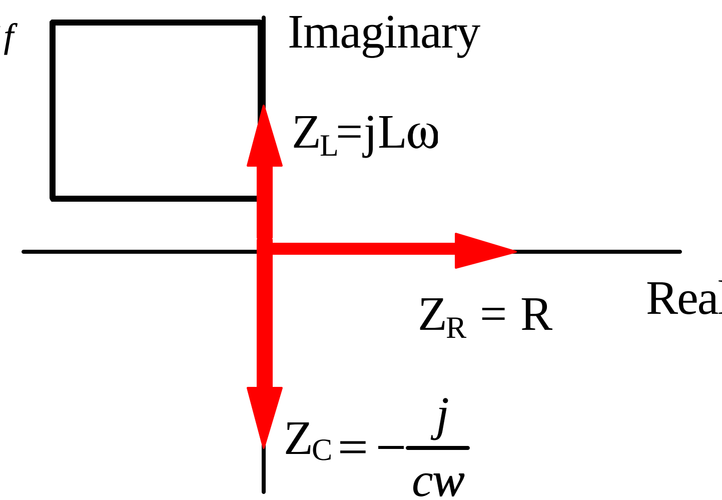
$$j = \sqrt{-1}$$

$$\tilde{A}\tilde{B} = |A||B|e^{j(f_A + f_B)}$$

$$\tilde{A}/\tilde{B} = \left(|A|/|B|\right)e^{j(f_A - f_B)}$$

$$\Delta\tilde{v} = -\tilde{i}\,\tilde{Z}$$



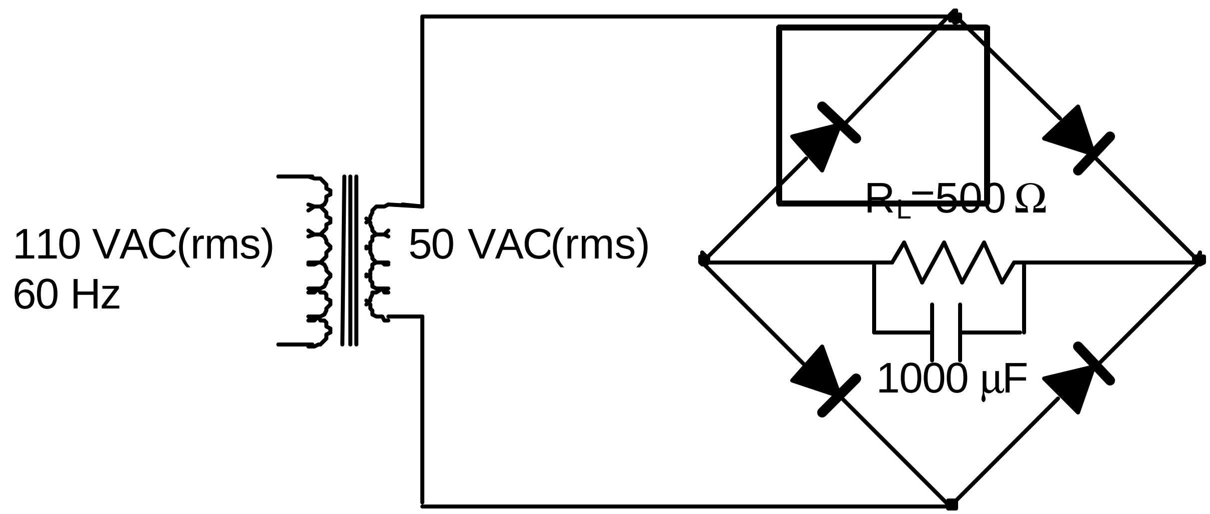


A 4-Ω resistor in series with a 7.96-mH inductor is connected to a 110-V 60-Hz source.

- Determine the impedance of the circuit.
- Determine the current flowing in the circuit.

Mid-Term Prep
Chapter 4

$$\Delta V \approx \frac{i}{C \cdot f} \qquad r = \frac{\Delta V}{V_{DC}} \qquad V_p = \sqrt{2} \cdot V_{rms}$$

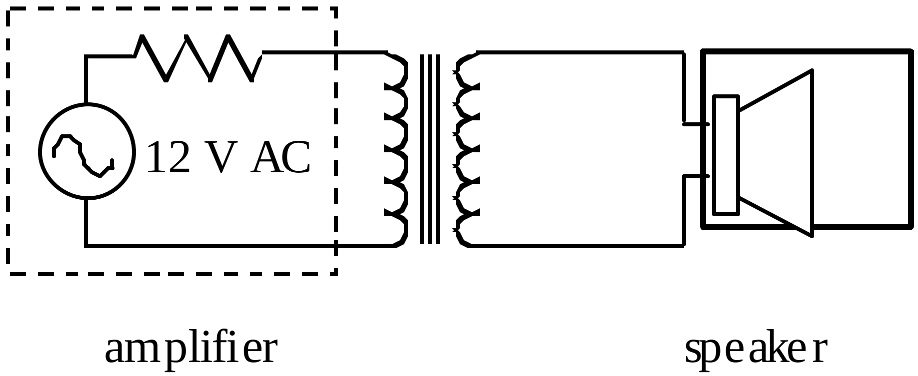


For the rectifier circuit above:

- What would the peak voltage across and current through the resistor be <u>without</u> the capacitor? (You should take into account the voltage drops across the diodes.)
- With the capacitor in place how much does the voltage across the resistor vary? (You may assume that the current remains very close to its maximum value.)
- What is the ripple factor for the circuit?

Mid-Term Prep
Chapter 4

$$\frac{v_s}{v_p} = \frac{N_s}{N_p} \qquad P_p \approx P_s \qquad \frac{Z_s}{Z_p} = \left(\frac{N_s}{N_p}\right)^2$$

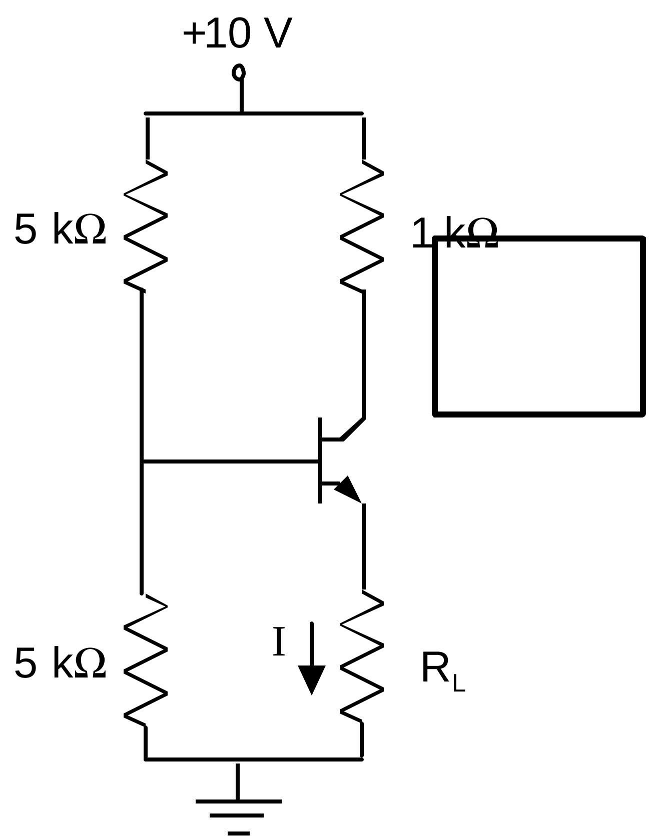


An amplifier with an output resistance of 50 kΩ is going to be used to drive an 8-Ω speaker. Determine the turns ratio for a transformer that will provide maximum power transfer to the speaker.

What is the power delivered to the speaker?

Mid-Term Prep
Chapter 5

$$I_B = I_E - I_C$$
$$I_C = bI_B$$
$$V_E = V_B - 0.6 \text{ V}$$



What is the current (I) through the load resistor as a function of R_L?

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