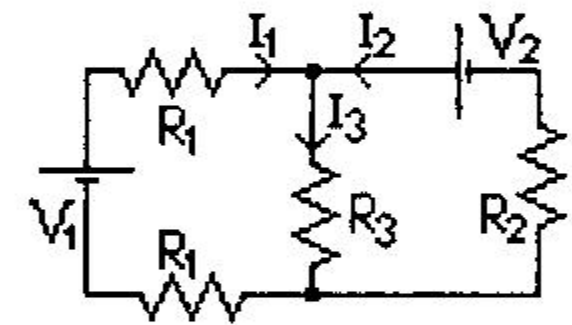Name: -----------------------------------

PHY 218
Quiz I

*Note: Cellular phones and programmable calculators are not allowed.*

1. For the circuit shown in the figure
   a. Write down the Kirchhoff Current and Voltage Laws. *(14 pts.)*
   b. Take V_1=9v, V_2=6v, R_1= R_2= R_3= 12Ω. Calculate I_2. *(6 pts.)*

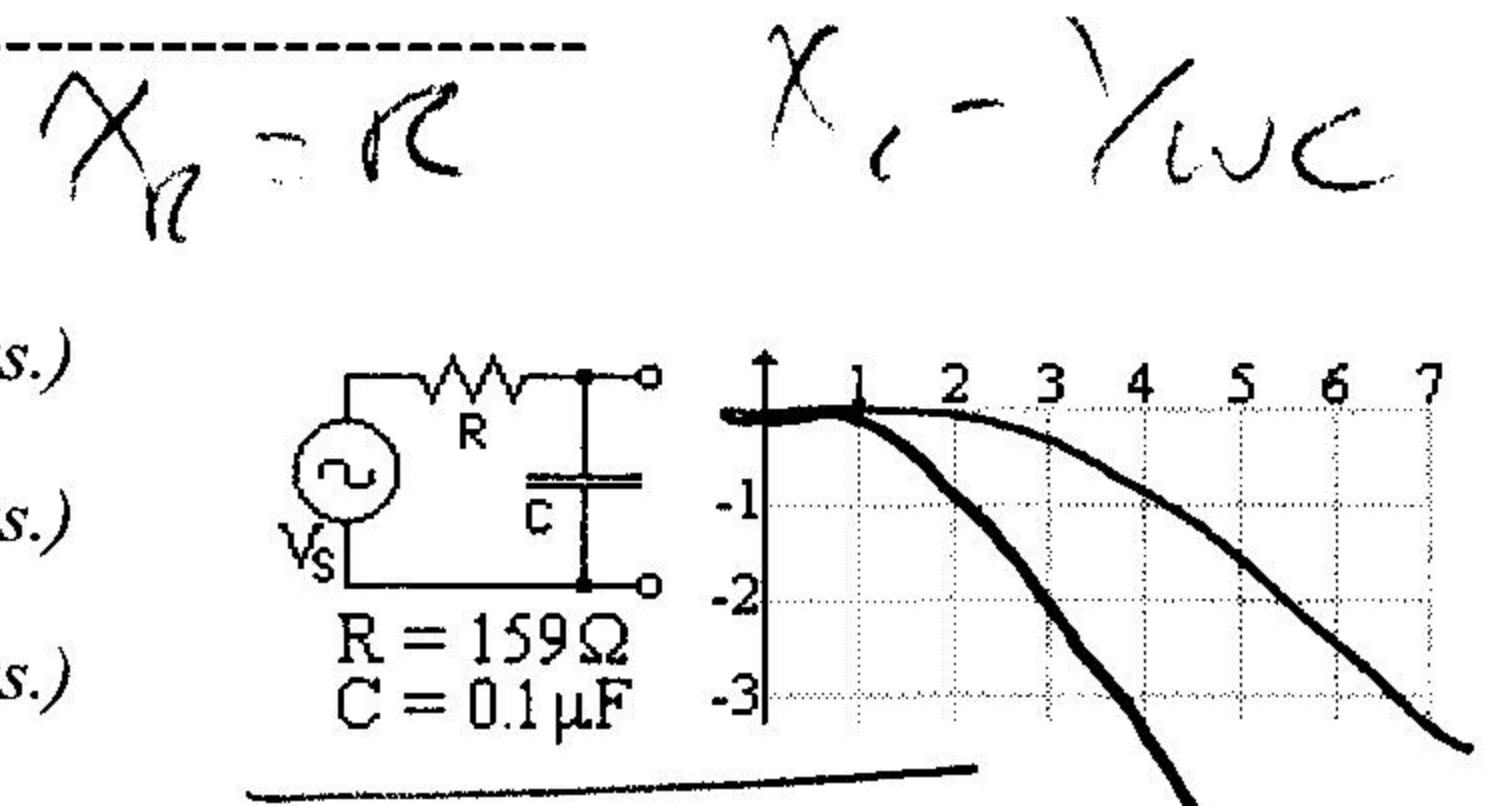---

2. For the circuit shown in the figure take V_s = 15v, $R_1 = R_2 = 60\Omega$.
   a. Follow any method of your choice to calculate I_1. *(10 pts.)*
   b. Calculate the power dissipated in (R_2) *(7 pts.)*
   c. Is Impedance Matching satisfied? Explain briefly. *(3 pts.)*

$X_R = R$ $X_c = 1/\omega C$
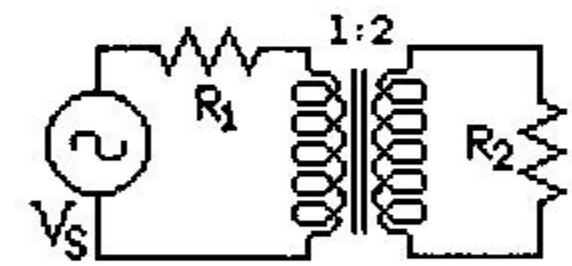
3. For the RC filter circuit shown in the figure
   a. Show that f_0 = 10 KHz *(5 pts.)*
   b. Argue that $\alpha = 1/[1 + (f/f_0)^2]^{1/2}$ *(6 pts.)*
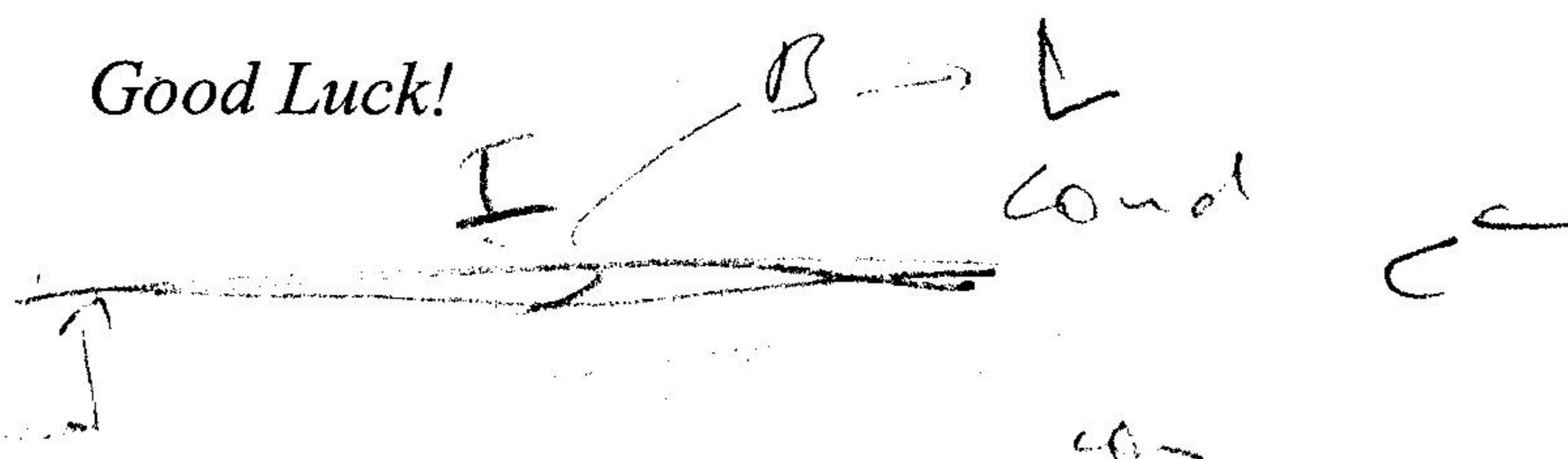   c. Draw the Bode Diagram for 10Hz < f < 10 MHz *(7 pts.)*

   Note: You may save time by drawing on the figure itself.

   R = 159Ω
   C = 0.1 μF

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4. Answer 6 of the following 9 questions briefly. *(6x7 = 42 pts.)*
   Note: The 7th answer will be ignored.

   a. Which type of resistors is the cheapest and which most expensive?

   b. Why is the physical size of capacitors proportional to its value, whereas this relation does not hold for resistors?

   c. Why did we use ODD Fourier harmonics only to construct a "square wave"

   d. When the characteristic Impedance (Zo) of a transmission line does NOT match that of the receiver, there will be reflections. Why does that impose an UPPER (not a lower) limit on the frequency?

   e. Why is a coaxial cable rather than a parallel pair of wires used in communications? *It prevents magnetic Variations*

   f. Define Thevenin's Theorem and give an example.

   g. For which frequencies will the filter in question 3 act an analogue computer? Explain briefly.

   h. Give two reasons explaining why inductors can't be used in chips.

   i. Why do transmission lines have capacitance and inductance?

Good Luck!   *2x20 + 18 + 42 = 100*