30. 1. POWER AND CORRECTION OF PF: 
   (5) 1a. Compute the impedance of the box.  
   (5) 1b. Compute the power dissipated by the box.  
   (5) 1c. Connect a C in parallel with the box.  
   What C changes the power factor to 1? 

   (5) 1d. Compute the power dissipated by the box.  
   (5) 1e. Compute the power factor for the box.  
   (5) 1f. Connect an L in parallel with the box.  
   What value of L corrects the power factor to 1?  
   NOTE: The handout formula does not apply here. 

30. 2. INTERPRETATION OF BODE MAGNITUDE PLOTS: 
   (10) 2a. What transfer function has the Bode magnitude plot shown at LEFT? 
   (10) 2b. A series RLC circuit has the Bode magnitude plot shown at CENTER.  
   From the plot, what are the poles? If R = 100Ω, compute L and C.  
   (10) 2c. A series RLC circuit has Bode magnitude plot whose PEAK is shown at RIGHT. 
   From the peak, what is the value of Q? If R = 100Ω, compute L and C. 

30. 3. DRAWING BODE MAGNITUDE PLOTS: 
   (10) 3a. Draw the Bode magnitude plot for \( H(j\omega) = \frac{320(j\omega+3000)}{(j\omega+30)(j\omega+350)} \) on the graph paper below at left. NEATNESS AND LEGIBILITY COUNT!  
   (10) 3b. Draw the Bode magnitude plot for \( H(j\omega) = \frac{10^{6}(j\omega+1000)}{(j\omega)^2+10000\omega+j10^8} \) on the graph paper below at right. What are \( \zeta \) and \( \omega_n \) for the denominator? 

30. 4. SIGNIFICANCE OF TRANSFER FUNCTIONS 
   (5) 4a. Compute the transfer function for the ideal op amp circuit.  
   Specify the magnitude and phase separately as functions of \( \omega \) 
   (5) 4b. If \( v_i(t) = \cos(t) + \frac{1}{3} \cos(2t) + \frac{1}{5} \cos(3t) + \ldots \), what is \( v_o(t) \)? Express your answer in terms of a sum of cosine functions. 
   (5) 4c. Using \( i = C \frac{dv_i}{dt} \), express \( v_o(t) \) in terms of \( v_i(t) \) for any \( v_i(t) \). 
   (5) 4d. For the specific \( v_i(t) \) in (4b), what is \( v_o(t) \) USING 4c? SHOW YOUR WORK!
GRADING COMMENTS:

WELL, IT WAS TOO EASY--I WAS BUSTED BY LOW SCORES FOR PROBLEM SETS 9, 10 (EVIDENTLY DUE TO THEIR LENGTH, NOT THEIR DIFFICULTY). NONETHLESS:

1. OMITTING FACTOR 2 OR TAKING BENCH. 2. OMITTING FACTOR OF 18 (W=36). 3. POOR DECISION. 4. V_0 = V_1 TIME PROBLEM IN PARALELL.

2. CONSTANT WAS WRONG 3 PTS.

3. WORRYING ABOUT 2 Pts.

4. TIE FOR MINIMUM, 5 Pts. IF YOU POOLED RC = (1000) 5 = 2000, 1000.

5. NOT 80, 20, 40, 80, 200, 400, 800.

SURPRISING NUMBER OF CALCULATOR-TYPE ERRORS THOUGH, AND SUCH.

HOW DO I GET AN A WITHOUT PRESSURE/