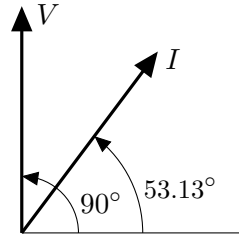
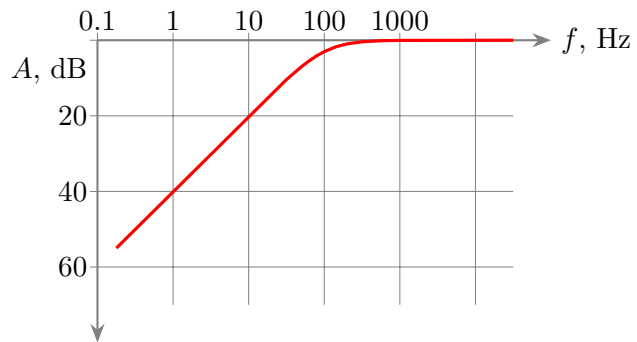
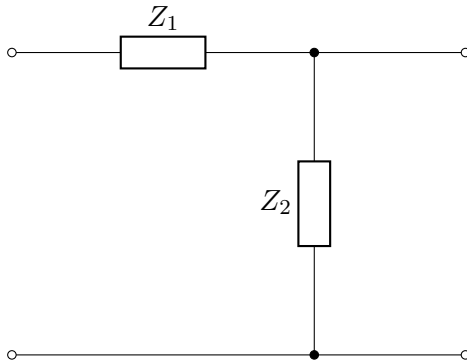


- (4) 1. Shown is the voltage-current phasor diagram for a two-element series circuit at angular frequency 300 rad/s. What are the two elements and their values if the phasor magnitudes are 200 V and 20 A?

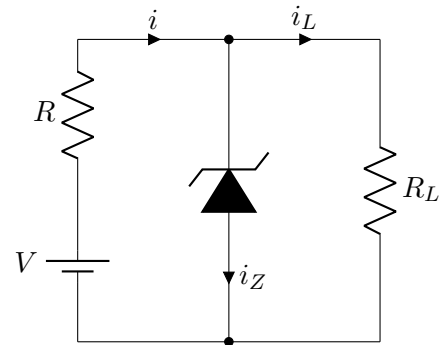


- (4) 2. The circuit shown has the following attenuation factor:



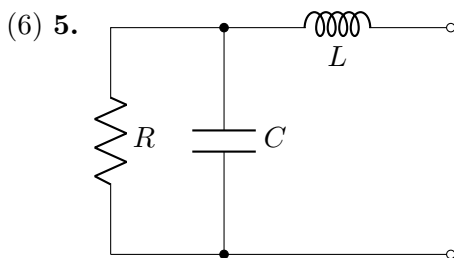
- (a) What type of circuit is this?
- (b) What circuit components  $Z_1$  and  $Z_2$  could you choose? Is there more than one way to obtain such attenuation factor  $A$  ?
- (c) Sketch the phase  $\varphi$  of  $V_{out}$ , relative to  $V_{in}$ , as a function of frequency  $f$ .

- (4) 3. This is a *voltage regulator* circuit, providing a constant voltage to the load  $R_L$ . Here,  $R = 1 \text{ k}\Omega$  and  $V = 25 \text{ V}$ . The maximum rated current through the 15-V Zener diode is 150 mA.



- (a) Over what range of  $R_L$  values is the regulator useful?
- (b) For a constant  $R_L = 5.0 \text{ k}\Omega$ , over what range of input voltages  $V$  can regulation be achieved?

- (2) 4. For *voltage* gains of 45 dB, 2.3 dB, -5.4 dB, calculate the multiplicative gain values, *i.e.*  $|V_{out}/V_{in}|$ . Repeat, interpreting the values as *power* gains.



- (a) Calculate the impedance  $Z = Z(\omega, L, C, R)$  of this circuit. Report the answer in polar form.
- (b) At what angular frequency/frequencies  $\omega$  is the circuit purely resistive?

(8) **6.** For this JFET amplifier, *briefly* describe the role played by each of

1-M $\Omega$  resistor; 500- $\Omega$  resistor and 5- $\mu$ F capacitor; and 0.1- $\mu$ F and 1- $\mu$ F capacitors.

