

Quiz 1 (Total 100 points)

It is a closed-book, closed-note quiz. Cheating leads to 0% score.

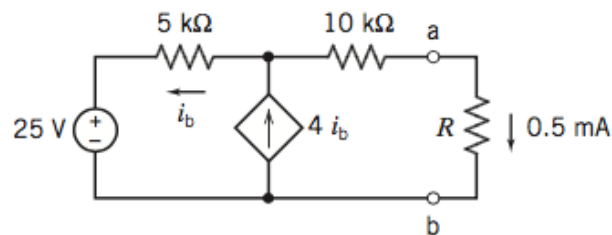
Calculator is allowed. Please show the process of thinking/calculation. Indicate your final answers clearly. Unit is needed if applicable.

1. A sinusoidal voltage source, $v = 10 \cdot \cos(\omega t)$ (V), is connected across a 100-Ohm resistor.

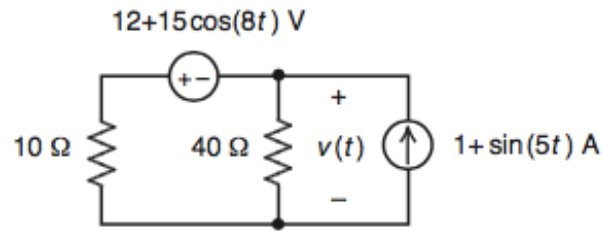
- (a) What is the current flowing through the resistor? (4%)
- (b) What is the instantaneous power supplied by the source to the resistor? (Hint: instantaneous power is a function of time, which indicates the power at any instant of time.) (8%)
- (c) What is the average power supplied by this sinusoidal source? (10%)
- (d) An ideal square wave generator is used as the voltage source instead of the sinusoidal source. If the square wave signal has a peak-to-peak value of 20 V and a zero average value, what is the average power supplied by the source? (10%)

2. (a) Find the Thevenin and Norton equivalent circuits of the circuit to the left of the terminals a, b in the following figure. (16%)

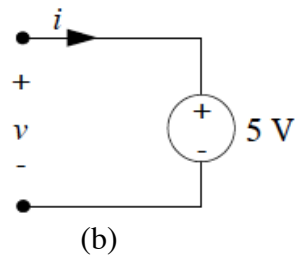
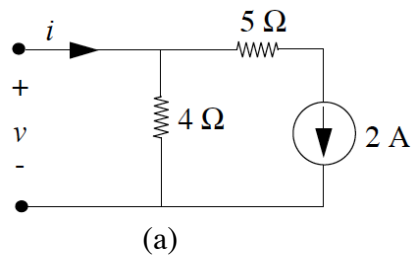
(b) What is the value of R? (6%)



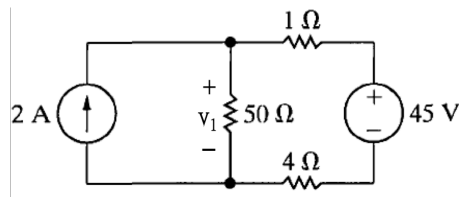
3. Find the node voltage potential $v(t)$ in the following figure. (12%)



4. Sketch the $i - v$ characteristics (a figure with “ i ” on y axis and “ v ” on the x axis) for the networks in the following figures. (10%)



5. (a) How many nodes and how many meshes are in the following figure? (6%)
 (b) Find the voltage v_1 in the network in the following figure using superposition. (8%)



6. Determine the values of the resistors R_1 , R_2 , and R_3 such that $v_1 = 12$ V, $v_2 = 5$ V, $v_3 = -12$ V, and the total power dissipated by the circuit by the 24 V source is 80 W in the following figure. Assume the “Common” node is at 0 V of voltage potential. (10%)

