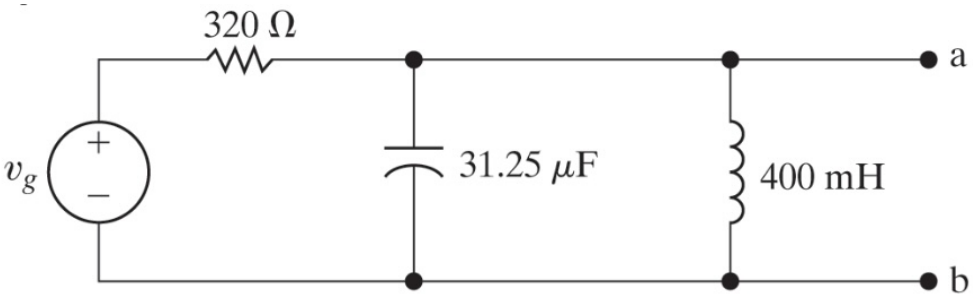
Question 1 [15]

The sinusoidal voltage source in the ciruit below is developing a voltage equal to $50sin(400t)V$.



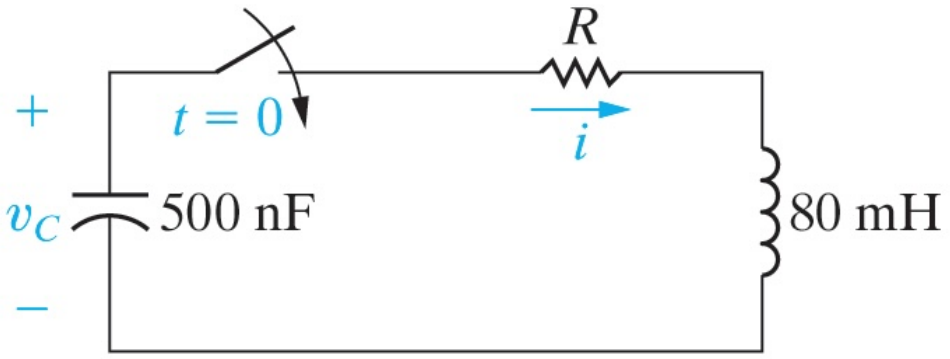
(a) Find the Thevenin voltage with respect to terminals a,b. Express in both complex $(a + jb)$ and Phasor form.

(b) Find the Thevenin impedance with respect to terminals a,b (in complex form).

(c) Draw the Thevenin equivalent circuit using a voltage source, resistor, capacitor and/or inductor.

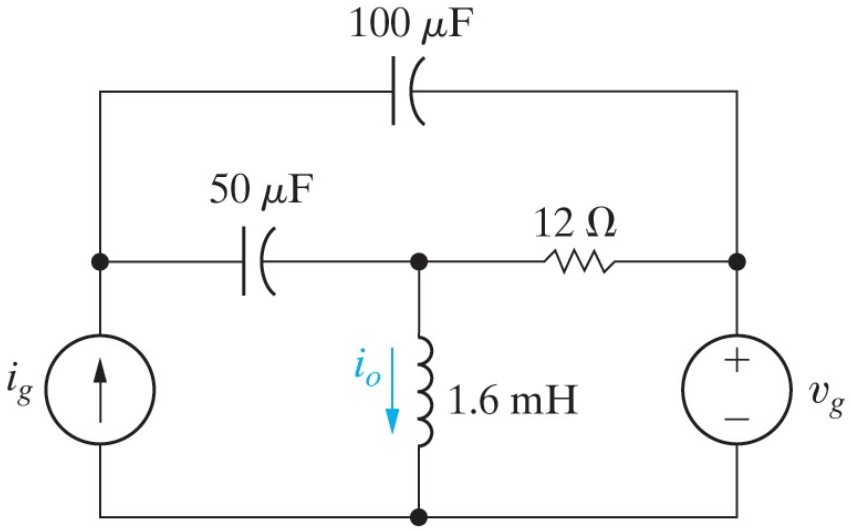
Question 2 [15]

Find the value of R that makes the below circuit Critically Damped.



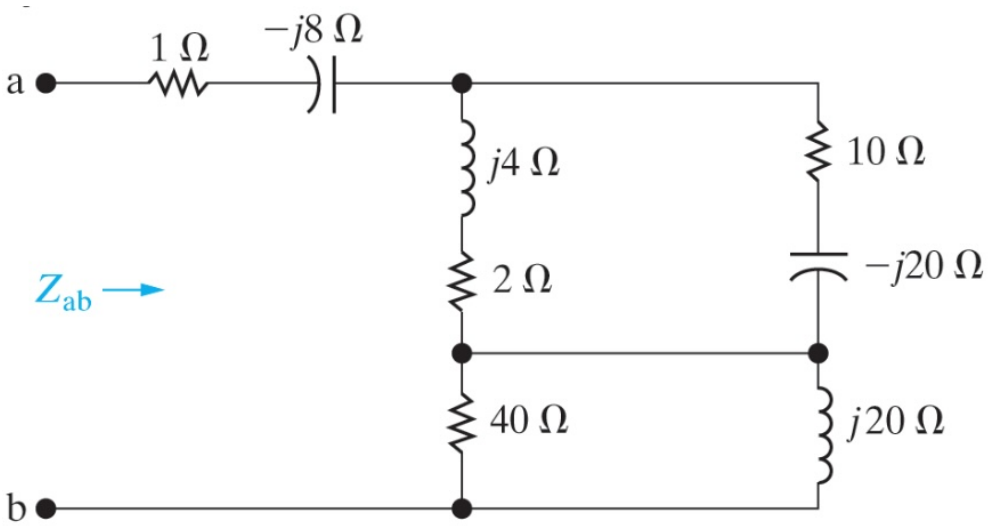
Question 3 [15]

Use the Node-Voltage method to find the matrix representation of V_1 and V_2 if $i_g = 5\cos(2500t)A$ and $v_g = 20\cos(2500t + 90°)V$. You do NOT need to solve for V_1 and V_2, nor reduce the matrix to reduced row echelon form.

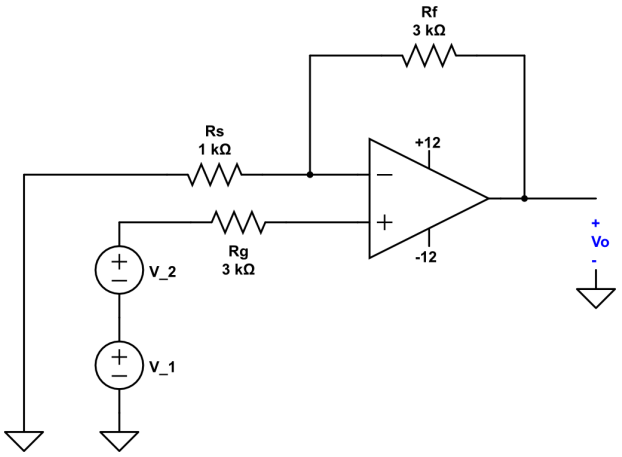


Question 4 [15]

Find Z_{eq} (Z_{ab}) for the circuit below.



Question 5 [20]



(a) What is the voltage at the inverting input (v_n) in terms of v_1 and v_2.

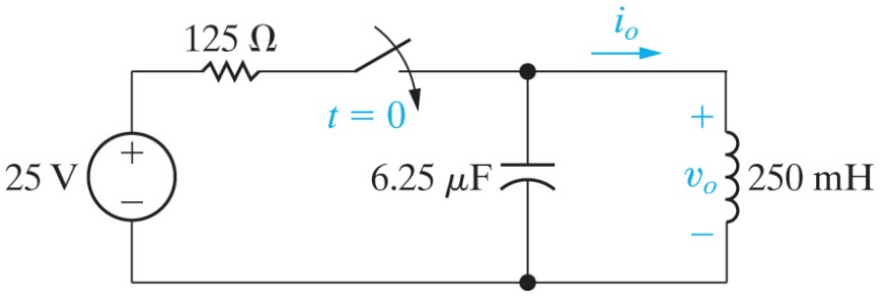
(b) Using Kirchhoff's Current Law, what is the equation for currents at the inverting input node?

(c) Using KCL Equation from (b), derive the equation for v_0 as a function of v_1 and v_2. What is the gain of this op amp circuit?

(d) If $v_1 = 1V$ and $v_2 = 3 * \cos(\frac{\pi}{2}t)$, draw a graph of v_o vs time. Show at least two periods of the output.

Question 6 [20]

Assume there is no energy stored in the circuit below when the swithc is closed at $t = 0$.



(a) Using the Source Transformation, redraw the circuit as a parallel RLC circuit.

(b) Find $i_0(t)$ for $t \geq 0$.

Extra Credit

Who was Max Salazar (either a factual or humorous answer will be accepted)?