name

1. Short answer questions; no explanations required.
   5%  (a) State the terminal law of a capacitor with capacitance 2 F.
   5%  (b) Is an inductor an open or short circuit at dc steady-state?
   5%  (c) When the input to an RLC circuit is \( v_i(t) = \cos \omega t \) the output is
   \[
   v_o(t) = \frac{2\omega}{\sqrt{1+4\omega^2}} \cos \left( \omega t + \tan^{-1}\left(\frac{1}{2\omega} \cdot 90^\circ\right) \right).
   \]
   Is this circuit a lowpass filter, highpass filter, bandpass filter or none of the above?
   5%  (d) Give the formula for the current \( i(t) \) whose phasor representation is \( 17 \angle -37^\circ \) with frequency 3 Hz.

2. Show how to interconnect several 1 F capacitors to obtain 2.5 F.
   10%

3. Find the Thevenin equivalent phasor circuit for the following:
   20%

![Image of a circuit diagram]

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4. 

10% (a) Write a differential equation for \( v(t) \) in the circuit shown above. Simplify your equation but do not solve.

15% (b) Find the steady-state voltage \( v(t) \). You may use any method.

5. Find the steady-state voltage \( v_0(t) \) in the circuit shown below.

25%

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HAVE A HAPPY THANKSGIVING HOLIDAY

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1. Short answer questions; no explanations required.

5% (a) State the terminal law of an inductor with inductance 3 H.

5% (b) Is a capacitor an open or short circuit at dc steady state?

5% (c) When the input to a certain RLC circuit is $v_i(t) = \cos \omega t$ the output is

$$v_o(t) = \sqrt{\frac{1}{1+9\omega^2}} \cos \left( \omega t + \tan^{-1} \left( -\frac{1}{3\omega} \right) \right).$$

Is this circuit a lowpass filter, highpass filter, bandpass filter or none of the above?

5% (d) Give the formula for the voltage $v(t)$ whose phasor representation is $13 \angle -24^\circ$ with frequency 5 Hz.

2. Show how to interconnect several 1 H inductors to obtain $3 \frac{1}{3}$ H.

10%

3. Find the Thevenin equivalent phasor circuit for the following.

20%
4. Write a differential equation for $i(t)$ in the circuit shown above. Simplify your equation but do not solve.

(a) Write a differential equation for $i(t)$ in the circuit shown above. Simplify your equation but do not solve.

(b) Find the steady-state current $i(t)$. You may use any method.

5. Find the steady-state voltage $v_0(t)$ in the circuit shown below.

25%