

112-1 ELECTRICAL ENGINEERING FUNDAMENTAL I

Name:

Quiz 5

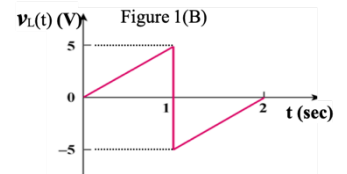
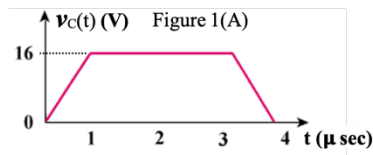
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Note: Show your mathematic works and make your calculation accuracy to at least the 4th digit behind the decimal point.

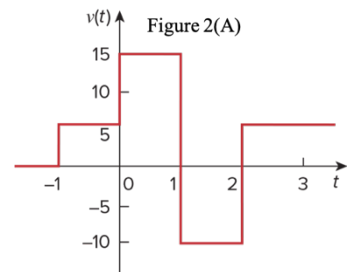
1. 15% (A) The voltage $v_C(t)$ across a **10-mF capacitor** is shown in Fig. 1(A), determine the current $i_C(t)$ through the capacitor.

15% (B) If the voltage $v_L(t)$ waveform in Fig. 1(B) is applied to a **10-mH inductor**, find the inductor current $i_L(t)$ for $0 < t < 2$ (s).

Assume $i_L(0) = 0$.



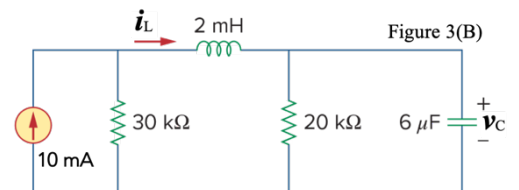
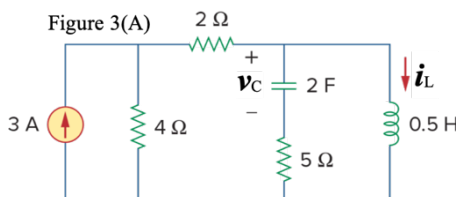
2. 10% (A) Express $v(t)$ in Fig. 2(A) in terms of step functions.



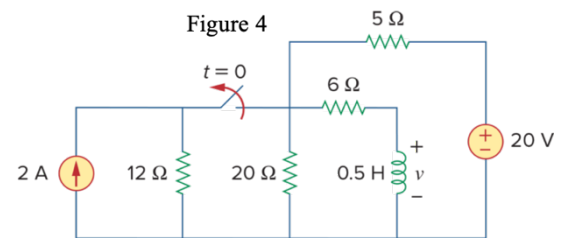
10% (B) Sketch the waveform represented by

$$i(t) = r(t) - r(t-1) - u(t-2) - r(t-2) + r(t-3) + u(t-4)$$

3. 30% Under steady-state dc conditions, find i_L , v_C and the **energy** stored in the **capacitor** and **inductor** in Fig. 3(A) and Fig.3(B).



4. 30% For the network shown in Fig. 4, find $v(t)$ for $t > 0$.



5. (30%) The switch in Fig. 5 has been in position *a* for a long time. At $t = 0$, it moves to position *b*.

(A) 20% Derive $v_C(t)$ and $i(t)$ for all $t > 0$.

(B) 10% Sketch the *waveform* of $v_C(t)$ for $t > 0$ and label the *time constant* on the waveform.

