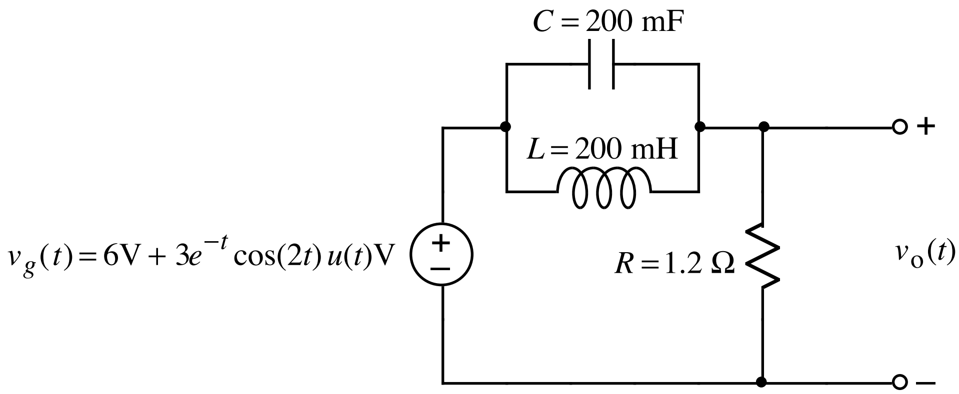
UNIT 3
PRACTICE EXAM

1.



Note: The 6 V in the $v_g(t)$ source is always on.

a) Write the Laplace transform, $V_g(s)$, of $v_g(t)$.

b) Draw the s-domain equivalent circuit, including source $V_g(s)$, components, initial conditions for L and/or C, and terminals for $V_o(s)$.

c) Write an expression for $V_o(s)$.

d) Apply the final value theorem to find $\lim_{t\to\infty} v_o(t)$.

2. a. Find $f(t)$ if

$$F(s) = \frac{s+2}{(s+1)^2\,(s+4)}$$

b. Plot the poles and zeros of $G(s)$ in the s plane

$$G(s) = \frac{12+4s}{(s+2)(s^2+25)(s^2+6s+25)}$$

c) Find $\mathcal{L}\{t\,u(t-3)\}$.

d) i. Find $\lim_{t\to\infty} f(t)$ if

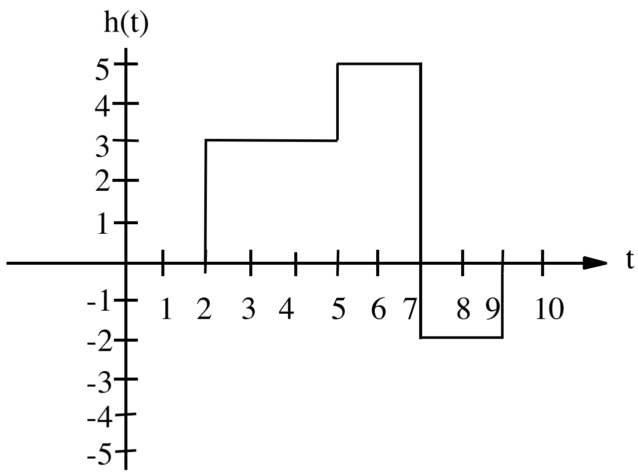
$$F(s) = \frac{2s^4+6s^3+30s^2+25s+120}{s^6+14s^5+112s^4+448s^3+975s^2+625s}$$

ii. Find $\lim_{t\to 0+} f(t)$ if

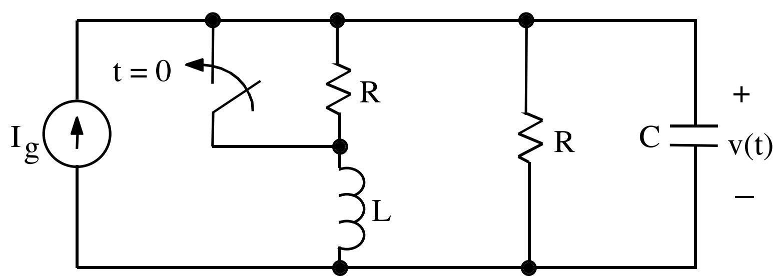
$$F(s)=\frac{3\left(s^3+7s^2+14s+8\right)}{s^4+14s^3+98s^2+350s+625}$$

(All poles of $F(s)$ are in the left-half plane.)

e. Write an expression for H(s), below.



3.



I_g = 1A

R = 4Ω

L = 0.1 mH

C = 1μF

The current source is a dc current source. After being open for a long time, the switch is closed at t = 0.

a) Write an expression for $V(s)$, the Laplace transform of $v(t)$.

b) From $V(s)$, the Laplace transform of $v(t)$, find the numerical values of $v(t)$ for $t = 0^+$ and $t \to \infty$.

c) By taking the inverse Laplace transform of $V(s)$, write a numerical time-domain expression for $v(t)$.