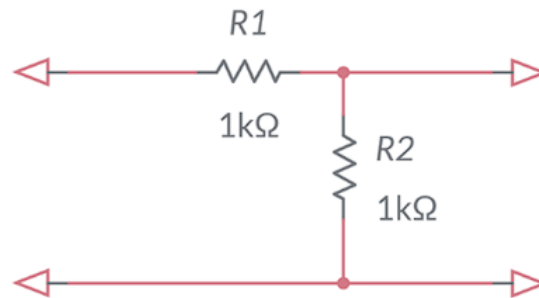


1 Question 2A



(a) Voltage divider circuit

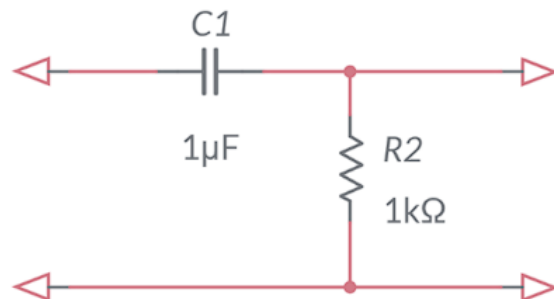
$$V_{out} = \frac{R_2}{R_1 + R_2} V_{in}$$

$$\frac{V_{out}}{V_{in}} = 0.5$$

$$H(s) = 0.5$$

This is a zero order and static system

2 Question 2B



(b) RC circuit

Converting to laplase domain $C_1 = \frac{1}{sC}$

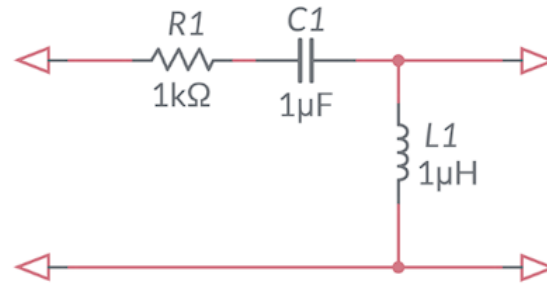
$$\frac{V_{out}}{V_{in}} = \frac{R_2}{\frac{1}{sC} + R_2}$$

$$\frac{V_{out}}{V_{in}} = \frac{R_2 s C}{1 + R_2 s C}$$

$$H(S) = \frac{s}{s + 10^3}$$

This is a first order and dynamic system

3 Question 2C



(c) RLC circuit

converting to laplace domain $C_1 = \frac{1}{sC}$, $L_1 = sL$.

$$\frac{V_{out}}{V_{in}} = \frac{sL}{R_1 + \frac{1}{sC} + sL}$$

$$\frac{V_{out}}{V_{in}} = \frac{s^2 LC}{s^2 LC + sR_1 C + 1}$$

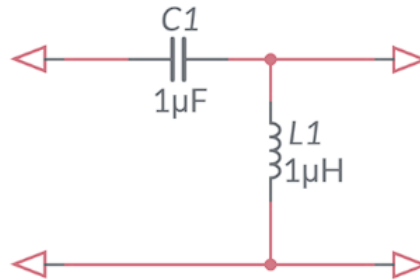
$$H(S) = \frac{s^2 LC}{s^2 LC + sR_1 C + 1}$$

$$H(S) = \frac{s^2 10^{-12}}{s^2 10^{-12} + s 10^{-3} + 1}$$

$$H(S) = \frac{s^2}{s^2 + s 10^9 + 10^{12}}$$

This is a second order and dynamic system

4 Question 2D



(d) LC circuit

converting to laplace domain $C_1 = \frac{1}{sC}$, $L_1 = sL$.

$$\frac{V_{out}}{V_{in}} = \frac{sL}{\frac{1}{sC} + sL}$$

$$\frac{V_{out}}{V_{in}} = \frac{s^2 LC}{s^2 LC + 1}$$

$$H(S) = \frac{s^2 LC}{s^2 LC + 1}$$

$$H(S) = \frac{s^2 10^{-12}}{s^2 10^{-12} + 1}$$

$$H(S) = \frac{s^2}{s^2 + 10^{12}}$$

This is a second order and dynamic system