



Determine the type of filter shown above and show that its cut off frequency is $\omega_c = \frac{1}{RC}$

Transferring to the S domain

$$A = R$$

$$C = \frac{1}{j\omega C}$$

$$H(\omega) = \frac{v_o}{v_i} = \frac{1}{1 + j\omega RC}$$

when

$$H(0) = 1$$

$$H(\omega) = 0$$

$$H(\omega_c) = \frac{1}{\sqrt{1 + \omega_c^2 R^2 C^2}} = \frac{1}{\sqrt{2}}$$

making ω_c subject of formula

$$\frac{1}{1 + \omega_c^2 R^2 C^2} = \frac{1}{2}$$

$$2 \times 1^2 = 1 + \omega_c^2 R^2 C^2$$

$$2 = 1 + \omega_c^2 R^2 C^2$$

$$1 = \omega_c^2 R^2 C^2$$

Squaring both sides

$$1 = \omega_c^2 R^2 C^2$$

$$1 = \omega_c RC$$

$$\omega_c = \frac{1}{RC}$$