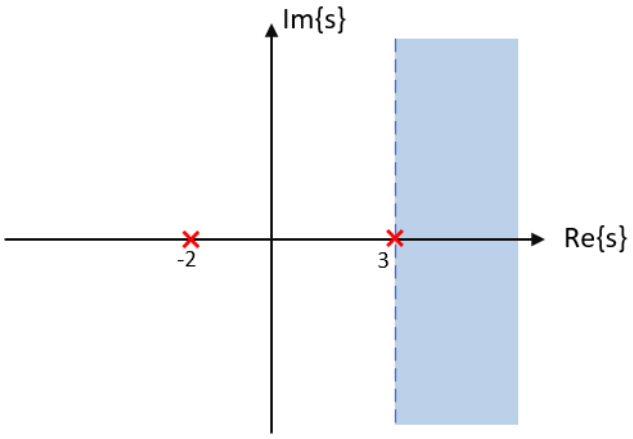
سوال ۱.

$$H(s)=\frac{1}{s^2-s-6}=\frac{1}{(s-3)(s+2)} \rightarrow \text{قطب ها}: s=3\,,s=-2$$

با توجه به اینکه سیگنال علی دست راستی است ، پس *ROC* تبدیل لاپلاس آن باید دست راستی باشد و در نتیجه :

$$\boldsymbol{ROC \equiv Re(s) > 3}$$



سوال ۲.

$$H(s)=\frac{1}{s^2-s-6}=\frac{1}{(s-3)(s+2)}=\frac{\frac{1}{5}}{s-3}-\frac{\frac{1}{5}}{s+2}$$

$$h(t)=\mathcal{L}^{-1}\{H(s)\}=\frac{1}{5}\mathcal{L}^{-1}\left\{\frac{1}{s-3}\right\}-\frac{1}{5}\mathcal{L}^{-1}\left\{\frac{1}{s+2}\right\}=\boldsymbol{\frac{1}{5}e^{3t}u(t)-\frac{1}{5}e^{-2t}u(t)}$$

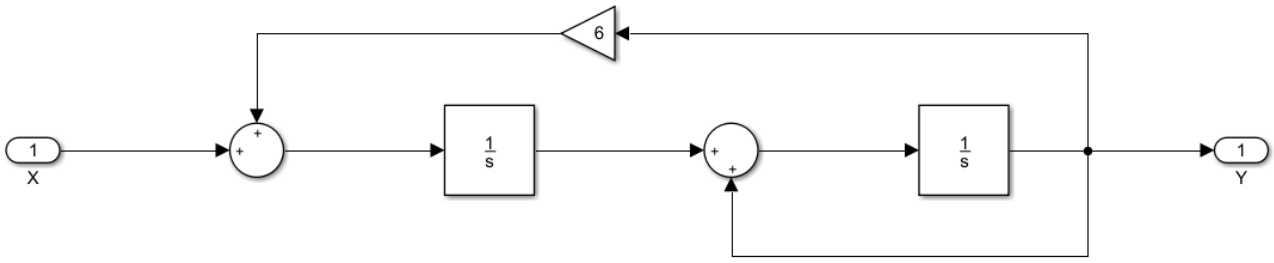
سوال ۳.

$$H(s)=\frac{Y(s)}{X(s)}=\frac{1}{s^2-s-6}$$

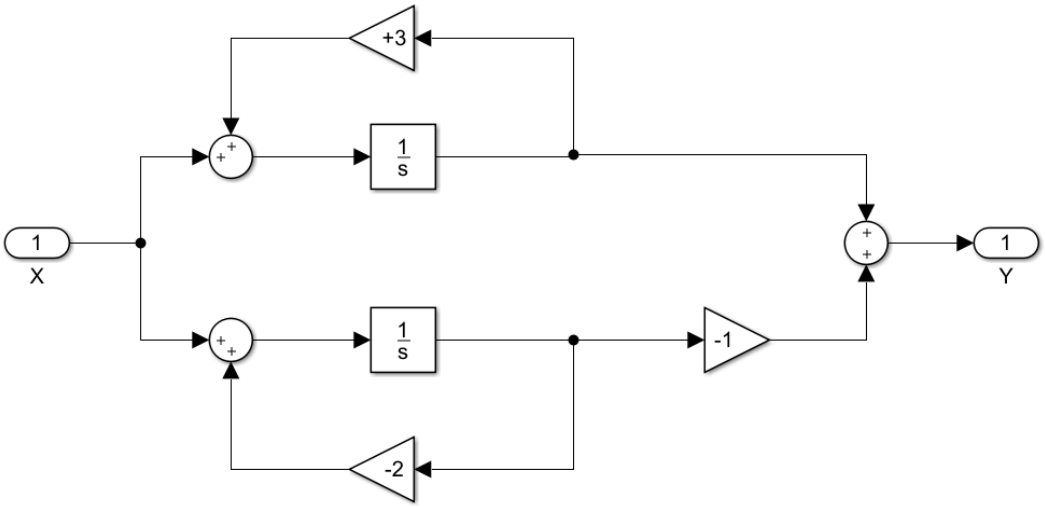
$$s^2Y(s)-sY(s)-6Y(s)=X(s) \rightarrow \boldsymbol{\frac{d^2y(t)}{dt^2}-\frac{dy(t)}{dt}-y(t)=x(t)}$$

سوال ۴.

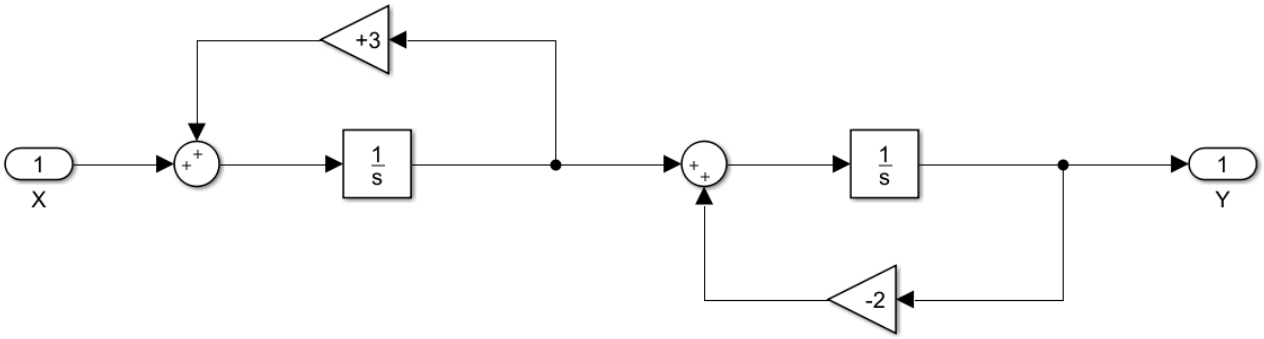
$$s^2Y(s)-sY(s)-6Y(s)=X(s) \rightarrow Y(s)=\frac{1}{s^2}[X(s)+6Y(s)]+\frac{1}{s}Y(s)$$



❋ تحقق موازی:



❋ تحقق سری:



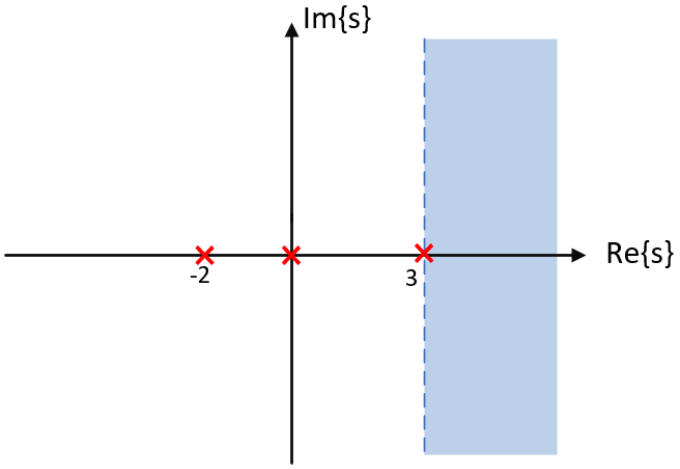
سوال ۵.

$$H(s) = \frac{1}{(s-3)(s+2)}$$

$$x(t) = u(t) \rightarrow X(s) = \frac{1}{s}$$

$$\rightarrow Y(s) = X(s)H(s) = \frac{1}{s(s-3)(s+2)} = -\frac{1}{6s} + \frac{1}{15(s-3)} + \frac{1}{10(s+2)}$$

$$\boldsymbol{ROC \equiv Re\{s\} > 3}$$



$$\rightarrow y(t) = -\frac{1}{6}u(t) + \frac{1}{15}e^{3t}u(t) + \frac{1}{10}e^{-2t}u(t)$$

❋ خروجی: