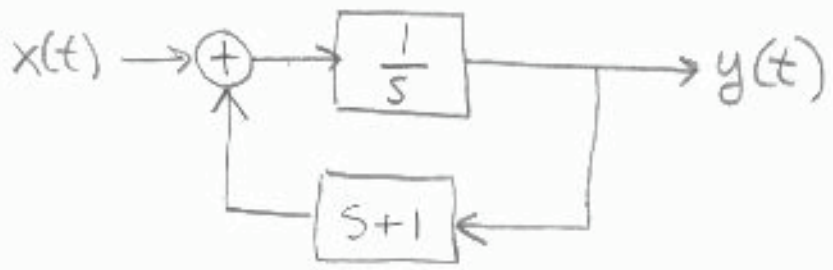
Use 0.7 mm mechanical pencil. Keep 0.25 inch from edge of box. Erase mistakes thoroughly.

FQ1 — Problem Type Acronym

Name

ID #

Question



write the differential equation for the system above.

Answer

The system response is

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

$$2\frac{dy(t)}{dt} - y(t) = x(t)$$

The negative sign is because $F(s) = -(s+1)$ where

$$\Rightarrow H(s) = \frac{G(s)}{1+F(s)G(s)}$$

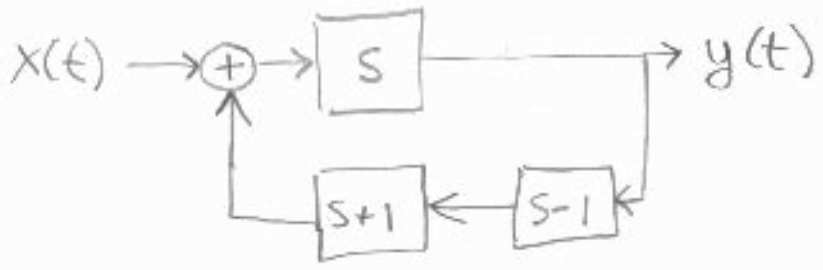
Use 0.7 mm mechanical pencil. Keep 0.25 inch from edge of box. Erase mistakes thoroughly.

FQ2
Problem Type Acronym

Name

ID #

Question



using the standard formula for feedback, write the differential equation for the system above

Answer

$$G(S) = S$$

$$F(S) = -(S+1)(S-1) = -S^2+1$$

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

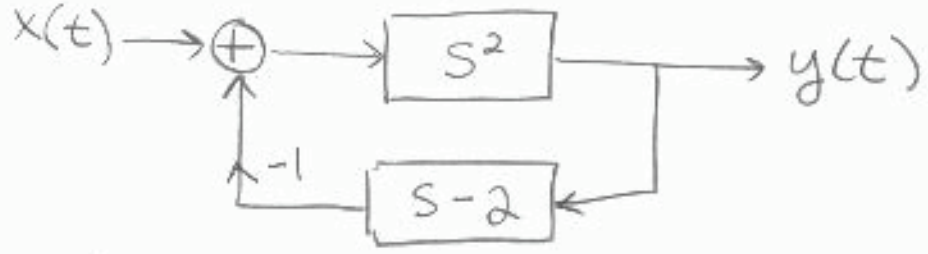
$$-\frac{d^3y(t)}{dt} + \frac{dy(t)}{dt} + y(t) = \frac{dx(t)}{dt}$$

Use 0.7 mm mechanical pencil. Keep 0.25 inch from edge of box. Erase mistakes thoroughly.

FQ 3 (Problem Type Acronym) _____ (Name) _____ (ID #)

Question

Use the standard feedback equation to compute the Laplace transform of the following system.



write the differential equation for the above system

Answer

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

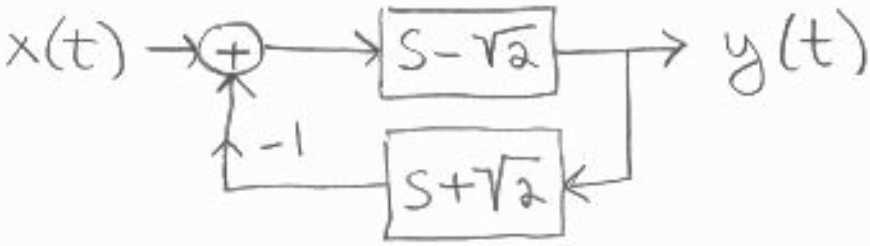
$$\frac{d^3y(t)}{dt^3} - 2\frac{d^2y(t)}{dt^2} + y(t) = \frac{d^2x(t)}{dt}$$

Use 0.7 mm mechanical pencil. Keep 0.25 inch from edge of box. Erase mistakes thoroughly.

FQ4 (Problem Type Acronym) _____ (Name) _____ (ID #)

Question

What is the Laplace Transform for the following Feedback system



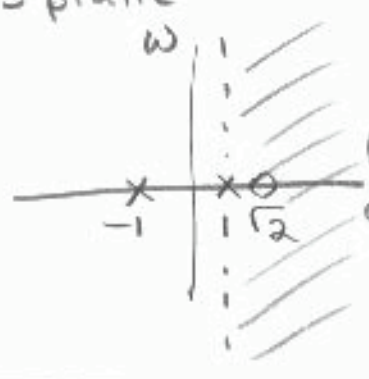
what differential equation governs this system? plot the poles + zeros. is it stable?

Answer

$$H(s)=\frac{G(s)}{1+F(s)G(s)}=\frac{s-\sqrt{2}}{1+s^2-2}=\frac{s-\sqrt{2}}{s^2-1}$$

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

$$\frac{d^2y(t)}{dt^2}-y(t)=\frac{dx(t)}{dt}-\sqrt{2}x(t)$$



ROC does not contain ω-axis

not stable