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1.

Causal LTI System.

$$\frac{dy(t)}{dt} + 2y(t) = \frac{dx(t)}{dt}$$

$$\Rightarrow y(t) + 2\int y(t)dt = x(t)$$

A → accumulator

$$\Rightarrow Y + 2AY = X$$

$$\Rightarrow Y(1+2A) = X$$

$$\Rightarrow \frac{Y}{X} = \frac{1}{1+2A}$$

$$\frac{Y}{X} = 1 - (2A) + (2A)^2 - (2A)^3 + \dots$$

$$\Rightarrow h(t) = \delta(t) - 2u(t) + 4tu(t) - \frac{8t^2}{2}u(t) + \dots$$

$$h(t) = \delta(t) - 2u(t)\left(1 - 2t + \frac{(2t)^2}{2} - \cdots\right)$$

$$h(t) = \delta(t) - 2u(t)\, e^{-2t}$$

$$\therefore \boxed{h(t) = \delta(t) - 2e^{-2t}u(t)}$$