

Example

Consider the system

$$\ddot{y} + 3\dot{y} + 2y = u, \quad y(0) = \dot{y}(0) = 0$$

(need two I.C.'s for 2nd-order ODE's)

Let's compute the transfer function: $H(s) = \frac{Y(s)}{U(s)}$

— take Laplace transform of both sides (zero I.C.'s):

$$s^2Y(s) + 3sY(s) + 2Y(s) = U(s) \quad H(s) = \frac{Y(s)}{U(s)} = \frac{1}{s^2 + 3s + 2}$$