

$$2(2x-1) = 3x + 2$$

$$4x - 2 = 3x + 2$$

$$4x - 3x = 2 + 2$$

$$x = 4$$

$$2x^2 + 3x + 2 = 3x^2 + 4x + 1$$

$$2x^2 + 3x + 2 - 3x^2 - 4x - 1 = 0$$

$$-x^2 - x + 1 = 0$$

$$x^2 + x - 1 = 0$$

$$x = \frac{-1 \pm \sqrt{1 + 4}}{2}$$

$$x = \frac{-1 \pm \sqrt{5}}{2}$$

$$y_0 = \frac{1}{(s^2+1)(s^2+4)}$$

$$= \frac{1}{s^2+1} - \frac{1}{s^2+4}$$

$$\frac{dy}{dt} - 4y = 1$$

$$Y'(s) - 4Y(s) = \frac{1}{s^2}$$

$$Y'(s) - 4Y(s) = \frac{1}{s^2}$$

$$(s-4)Y(s) = \frac{1}{s} + 2 = \frac{1+2s}{s} \Rightarrow Y(s) = \frac{2s+1}{s(s-4)}$$

$$\frac{2s+1}{s(s-4)} = \frac{A}{s} + \frac{B}{s-4}$$

$$2s+1 = A(s-4) + Bs$$

$$2(s)+1 = A(s-4) \Rightarrow A = -2$$

$$1(4)+1 = A(4-4) + B(4) \Rightarrow B = 4$$

$$= \left[\frac{-2}{s} + \frac{4}{s-4} \right]$$

$$= -2 + 4e^{4t}$$

$$\frac{d^2y}{dt^2} - 2\frac{dy}{dt} + 5y = e^{2t}$$

$$Y''(s) - 2Y'(s) + 5Y(s) = \frac{1}{s-2}$$

$$s^2 Y(s) - 2sY(s) - 2Y(s) - 2sY(s) + 5Y(s) = \frac{1}{s-2}$$

$$s^2 Y(s) - 2sY(s) - 2Y(s) = \frac{1}{s-2}$$

$$s^2 Y(s) - 2sY(s) - 2Y(s) = \frac{1}{s-2}$$

$$s^2 Y(s) - 2sY(s) - 2Y(s) = 2sY(s) + 2Y(s) + 5Y(s) = \frac{1}{s-2}$$

$$(s^2 - 2s + 5)Y(s) + (2s - 2)Y(s) = \frac{1}{s-2}$$

$$Y(s) = \frac{1}{(s-2)(s^2 - 2s + 5)} = \frac{1}{(s-2)(s^2 - 2s + 5)}$$

$$\frac{1}{s^2 - 2s + 3} = \frac{A}{s-1} + \frac{B}{s-2}$$

$$1 = (s-1)(s-2) \left(\frac{A}{s-1} + \frac{B}{s-2} \right) = 1 + 2s^2 - 4s + 2s + 4s - 2s + 4$$

$$1 = 2s^2 - 2s + 4$$

$$(s-1)(s-2) = (s^2 - 3s + 2)$$

$$2s^2 - 2s + 4 = \frac{A}{s-1} + \frac{B}{s-2}$$

$$2s^2 - 2s + 4 = A(s-2) + B(s-1)$$

$$A = 2$$

$$-2A + B = -2$$

$$B = -2 + 4 = 2$$

$$= \frac{2}{s-1} + \frac{2}{s-2}$$

$$= 2e^{2t} - \frac{1}{3}e^{-2t}$$

$$y'' - 6y' + 2y = e^{2t}$$

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

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

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

$$Y(s) = \frac{A}{s-2} + \frac{B}{s-3} + \frac{C}{s-4}$$

$$1 = A(s-3)(s-4) + B(s-2)(s-4) + C(s-2)(s-3)$$

$$1 = A(s^2 - 7s + 12) + B(s^2 - 6s + 8) + C(s^2 - 5s + 6)$$

$$1 = (A+B+C)s^2 + (-7A-6B-5C)s + (12A+8B+6C)$$

$$1 = 0s^2 + 0s + 1 \Rightarrow A+B+C = 0$$

$$-7A - 6B - 5C = 0$$

$$12A + 8B + 6C = 1$$

$$A = \frac{1}{2}, B = \frac{1}{2}, C = -1$$

$$Y(s) = \frac{1}{2(s-2)} + \frac{1}{2(s-3)} - \frac{1}{s-4}$$