

Actividad 7

Díaz Hernández Marcos Bryan

Ecuaciones Diferenciales

Grupo: 25

• Resolver $y'' - 3y' + 2y = e^{4t}$ $y(0) = 1$ $y'(0) = 5$

$$2 \{ y'' - 3y' + 2y \} = 2 \{ e^{4t} \}$$

$$2 \{ y'' \} - 3 \{ 2y' \} + 2 \{ 2y \} = 2 \{ e^{4t} \}$$

$$s^2 y(s) - s y(0) - y'(0) - 3(s y(s) - y(0)) + 2 y(s) =$$

$$\frac{s^2 y(s) - s - 5 - 3s y(s) + 3 + 2 y(s)}{s+4} = \frac{1}{s+4}$$

$$y(s)(s^2 - 3s + 2) = \left(\frac{1}{s+4} \right) + s + 2$$

$$y(s) = \frac{1 + s^2 + 4s}{s+4} + 2 = \frac{s^2 + 4s + 1 + 2s + 8}{s+4} = \frac{s^2 + 6s + 9}{s+4}$$

$$y(s) = \frac{s^2 + 6s + 9}{(s+4)(s^2 - 3s + 2)} = \frac{s^2 + 6s + 9}{(s+4)(s-2)(s-1)}$$

Actividad 7

Díaz Hernández Marcos Bryan

Ecuaciones Diferenciales

Grupo: 25

$$\frac{s^2 + 6s + 9}{(s+4)(s-2)(s-1)} = \frac{A}{(s+4)} + \frac{B}{(s-2)} + \frac{C}{(s-1)}$$

$$s^2 + 6s + 9 = A(s^2 - 3s + 2) + B(s+4)(s-1) + C(s+4)(s-2)$$

$$= A(s^2 - 3s + 2) + B(s^2 + 3s - 4) + C(s^2 + 2s - 8)$$

$$(A+B+C)s^2 + (-3A+3B+2C)s + (2A-4B-8C)$$

$$\begin{array}{l} A+B+C=7 \\ -3A+3B+2C=6 \\ 2A-4B-8C=9 \end{array} \quad \left| \begin{array}{cccc|c} 1 & 1 & 1 & 1 & 7 \\ -3 & 3 & 2 & 6 & 6 \\ 2 & -4 & -8 & 9 & 9 \end{array} \right| = \begin{array}{ccc|c} 1 & 1 & 1 & 7 \\ 0 & 6 & 5 & 9 \\ 0 & -6 & -10 & 7 \end{array} \quad \begin{array}{ccc|c} 1 & 1 & 1 & 7 \\ 0 & 6 & 5 & 9 \\ 0 & 0 & -5 & 16 \end{array}$$

$$\begin{array}{l} -5C=16 \quad C=-\frac{16}{5} \\ C=16/5 \end{array} \quad \begin{array}{l} 6b=25 \\ b=25/6 \end{array} \quad A + \frac{25}{6} - \frac{16}{5} = 7$$

$$A = \frac{125-96}{30} = \frac{29}{30} \quad A = 7 - \frac{29}{30} \quad A = \frac{1}{30}$$

$$y(s) = \frac{\frac{1}{30}}{(s+4)} = \frac{1}{30(s+4)} + \frac{25}{6(s-2)} - \frac{16}{5(s-1)}$$

$$2^{-7} \left\{ \frac{1}{30(s+4)} \right\} + 2^{-7} \left\{ \frac{25}{6(s-2)} \right\} - 2^{-7} \left\{ \frac{16}{5(s-1)} \right\}$$

$$y(t) = \frac{1}{30}(e^{-4t}) + \frac{25}{6}(e^{2t}) - \frac{16}{5}(e^{t})$$