

Conto #08 A.

1. Resuelva  $x^2 y'' - 2xy' + 2y = x^4 e^x$

$$x^r \quad r(r-1) - 2r + 2 = r^2 - 3r + 2 = 0$$
$$(r-2)(r-1) = 0. \quad r = 1, 2.$$

Raíces Distintas  $y_c = C_1 x + C_2 x^2$

Wronskiano:  $W = \begin{vmatrix} x & x^2 \\ 1 & 2x \end{vmatrix} = 2x^2 - x^2 = x^2$

Forma Estándar:  $y'' - \frac{2}{x} y' + \frac{2}{x^2} y = x^2 e^x$

$$u_1' = -\frac{f y_2}{W} = -\frac{x^2 e^x x^2}{x^2} = -e^x x^2 \quad u_2' = \frac{f y_1}{W} = \frac{x^2 e^x x}{x^2}$$

Integre:  $-\int x^2 e^x dx = -x^2 e^x + 2x e^x - 2e^x$

Tabular.

$-x^2$	$\downarrow +$	$e^x$
$-2x$	$\downarrow -$	$e^x$
$-2$	$\downarrow +$	$e^x$
$0$	$\downarrow +$	$e^x$

$$\int x e^x dx = x e^x - e^x$$

$$y_p = u_1 y_1 + u_2 y_2 = -(x^2 e^x - 2x e^x - 2e^x) x + (x e^x - e^x) x^2$$

$$y_p = -x^3 e^x + 2x^2 e^x - 2x e^x + x^3 e^x - x^2 e^x = x^2 e^x - x e^x$$

Soln.  
General:

$$y = C_1 x + C_2 x^2 + x^2 e^x - x e^x$$

# Conto 08 B

Resuelva  $x^2 y'' - 3xy' + 4y = 6x^4$   $y = x^r$

Ec. Auxiliar:  $r(r-1) - 3r + 4 = r^2 - 4r + 4 = 0$

Raíz Repetida:  $(r-2)^2 = 0$   $r = +2, +2.$

Soln. General:  $y = C_1 x^2 + C_2 x^2 \ln x$

Forma Estándar:  $y'' - \frac{3}{x} y' + \frac{4}{x^2} y = 6x^2$  }  $f(x)$

Wronskiano:  $W = \begin{vmatrix} x^2 & x^2 \ln x \\ 2x & 2x \ln x + x \end{vmatrix} =$

$W = 2x^3 \ln x + x^3 - 2x^3 \ln x = \underline{x^3}$

$u_1' = -\frac{f y_2}{W} = -\frac{6x^2 x^2 \ln x}{x^3} = -6x \ln x$

$u_2' = \frac{f y_1}{W} = \frac{6x^2 x^2}{x^3} = 6x \Rightarrow u_2 = 3x^2.$

$u_1 = -\int \underbrace{6 \ln x}_u \underbrace{x dx}_{dv} = -3x^2 \ln x + \int 3x dx$   
 $= -3x^2 \ln x + \frac{3}{2} x^2$

$y_p = u_1 y_1 + u_2 y_2 = -3x^4 \ln x + \frac{3}{2} x^4 + 3x^4 \ln x = \frac{3}{2} x^4$  + 10 pts.

Soln. Gral.  $y = y_c + y_p = C_1 x^2 + C_2 x^2 \ln x + \frac{3}{2} x^4$