

Prob 2 $\lambda^2 + 2\lambda + 1 = (\lambda + 1)^2$

$\beta = -1$ $y_p = A x^2 e^{-x}$

$k = 2$ $y_p' = A e^{-x} (2x - x^2)$

$l = 0$ $y_p'' = A e^{-x} (2 - 4x + x^2)$

$y_p'' + 2y_p' + y_p = A e^{-x} 2 = e^{-x}$

$A = \frac{1}{2}$ $y_p = \frac{1}{2} x^2 e^{-x}$

$y = \frac{1}{2} x^2 e^{-x} + C_1 e^{-x} + C_2 x e^{-x}$

$y(0) = C_1 = 1$

$y'(x) = e^{-x} (2x + C_2 - \frac{1}{2} x^2 - C_1 - C_2 x)$

$y'(0) = C_2 - C_1 = 1$ $C_2 = 2$

$y = \frac{1}{2} x^2 e^{-x} + e^{-x} + 2x e^{-x}$