p2. $u'' - 2u' + u = 1$, $u(0) = 0$, $u'(1) = 1$.

$\Rightarrow$ the characteristic func $= r^2 - 2r + 1 = 0 \Rightarrow r = 1$ (multiplicity $= 2$)

$\Rightarrow$ the homogeneous sol: $u_h(x) = (A + Bx)e^x$.

Add the particular sol: $u = (A + Bx)e^x + 1$.

Consider B.C.

$u(0) = 0 \Rightarrow A + 1 = 0 \Rightarrow A = -1$.

$u'(1) = 1 \Rightarrow (B - 1 + B)e = 1 \Rightarrow B = \frac{e+1}{2e}$

$\Rightarrow u = \left(\frac{e+1}{2e}\right)xe^x - e^x + 1$.