WRITE YOUR NAME:

MAP 2302 Quiz 13
Thursday October 17th

Find the general solution of the nonhomogeneous differential equation.

$$y'' - 3y' + 2y = 2x + 1$$

STEP 1. Homog eqn $y'' - 3y' + 2y = 0$ has aux eqn $r^2 - 3r + 2 = 0$

$\Rightarrow (r-1)(r-2) = 0 \Rightarrow r = 1, r = 2$

General soln of homog eqn is $y = C_1 e^x + C_2 e^{2x}$.

STEP 2. Find a particular soln of the nonhomog eqn.

Try $y = Ax + B \Rightarrow y' = A \Rightarrow y'' = 0$

Plug into DE. Want $\underbrace{0}_{y''} - \underbrace{3 \cdot A}_{y'} + \underbrace{2(Ax + B)}_{y} = 2x + 1$

$\Rightarrow -3A + 2Ax + 2B = 2x + 1$

$2Ax + (-3A + 2B) = 2x + 1$

$\Rightarrow$ (i) $2A = 2 \rightarrow A = 1 \rightarrow$ plug into (ii) $\rightarrow -3 + 2B = 1$

(ii) $-3A + 2B = 1$

$2B = 4$

$B = 2$

$y = x + 2$ is a particular soln

Final answer: $y = C_1 e^x + C_2 e^{2x} + x + 2$