Math 158-QUIZ 5 NAME: Key

Show all work to receive partial credit!

(3 pts) 1. Show that $y(x) = xe^{2x}$ is a solution of $y'' - 4y' + 4y = 0$.

1pt $y' = e^{2x} + 2xe^{2x} = (1+2x)e^{2x}$

1pt $y'' = 2e^{2x} + 2e^{2x} + 4xe^{2x} = (4+4x)e^{2x}$

1pt $y'' - 4y' + 4y = (4+4x)e^{2x} - 4(1+2x)e^{2x} + 4xe^{2x}$

$= 0.$

(7 pts) 2. Find the solution of the solution of the differential equation

$$y'' + 5y' + 6y = 0, \quad y(0) = 1, \; y'(0) = 1$$

by first finding the general solution (4pts), then finding c_1 and c_2 using the initial conditions (3pts).

$\lambda^2 + 5\lambda + 6 = 0 \qquad (\lambda+2)(\lambda+3) = 0$

$\lambda = -3, -2.$

4pts. $\boxed{y(x) = c_1 e^{-3x} + c_2 e^{-2x}}$; $y'(x) = -3c_1 e^{-3x} - 2c_2 e^{-2x}$

$1 = y(0) = c_1 + c_2$

3pts $1 = y'(0) = -3c_1 - 2c_2$

$c_1 = 1 - c_2$

$1 = -3(1-c_2) - 2c_2 = -3 + c_2 \Rightarrow \boxed{c_2 = 4}$ $\boxed{c_1 = -3}$

So $y(x) = -3e^{-3x} + 4e^{-2x}$