

Math 2310H, Diff Eq Problems, Fall 2002

Questions (Find the general solution to the first four problems using the method of undetermined coefficients, and a particular solution to the last two using the method of variation of parameters)

1. $y'' + y' - 2y = 2x, \quad y(0) = 0, \quad y'(0) = 1.$

2. $2y'' - 4y' - 6y = 3e^{2x}.$

3. $y'' + 2y' = 3 + 4 \sin(2x).$

4. $y'' + 2y' + y = e^x \cos x.$

5. $y'' - y' - 2y = 2e^{-x}.$

6. $y'' + 2y' + y = 3e^{-x}.$

Solutions

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

2. $y = C_1 e^{3x} + C_2 e^{-x} - \frac{1}{2}e^{2x}.$

3. $y = C_1 + C_2 e^{-2x} + \frac{3}{2}x - \frac{1}{2} \sin(2x) - \frac{1}{2} \cos(2x).$

4. $y = C_1 e^{-x} + C_2 x e^{-x} + \frac{1}{25}e^x (3 \cos(x) + 4 \sin(x)).$

5. $y = -\frac{2}{3}x e^{-x}.$

6. $y = \frac{3}{2}x^2 e^{-x}.$