Homogeneous equations

Solve each differential equation or IVP.

1. $4y'' + 4y' + 17y = 0$, $y(0) = -1$, $y'(0) = 2$

2. $y'' - 16y = 0$

3. $y'' + 16y = 0$

4. $y''' + 3y'' - 4y = 0$

5. $\dfrac{d^4y}{dx^4} + 2\dfrac{d^2y}{dx^2} + y = 0$

6. $y'' - 6y' + 25y = 0$, $y(0) = 3$, $y'(0) = 1$

7. $y'' - 4y' + 3y = 0$, $y(0) = 7$, $y'(0) = 11$

ANSWERS

1. $y(x) = -e^{-x/2}\cos(2x) + \dfrac{3}{4}e^{-x/2}\sin(2x)$

2. $y(x) = C_1 e^{4x} + C_2 e^{-4x}$

3. $y(x) = C_1 \cos(4x) + C_2 \sin(4x)$

4. $y(x) = C_1 e^x + C_2 e^{-2x} + C_3 x e^{-2x}$

5. $y(x) = C_1 \cos(x) + C_2 \sin(x) + C_3 x \cos(x) + C_4 x \sin(x)$

6. $y(x) = 3e^{3x}\cos(4x) - 2e^{3x}\sin(4x)$

7. $y(x) = 5e^x + 2e^{3x}$