Non-homogeneous equations

Solve each differential equation or IVP.

1. $3y'' + y' - 2y = 2\cos x$
2. $y'' - 4y = 2e^{2x}$
3. $y'' - 3y' + 2y = 3e^{-x} - 10\cos(3x)\,,\ y(0) = 1,\ y'(0) = 2$
4. $y''' - 2y'' + y' = 1 + xe^{x},\ y(0) = 0,\ y'(0) = 0,\ y''(0) = 0$

ANSWERS

1. $y(x) = C_1 e^{2x/3} + C_2 e^{-x} - \frac{5}{13}\cos x + \frac{1}{13}\sin x$
2. $y(x) = C_1 e^{2x} + c_2 e^{-2x}\frac{1}{2}xe^{2x}$
3. $y(x) = -\frac{1}{2}e^{x} + \frac{6}{13}e^{2x} + \frac{1}{2}e^{-x} + \frac{7}{13}\cos(3x) + \frac{9}{13}\sin(3x)$
4. $y(x) = 4 - 4e^{x} + 3xe^{x} + x - \frac{1}{2}x^2e^{x} + \frac{1}{6}x^3e^{x}$