1, Find the general solution using the method of variation of parameters

$$y'' + 9\,y = 12\,\sec(3\,x)$$

2, Find the general solution using the method of undetermined coefficients

$$y'' + 4\,y' + 4\,y = 7\,x - 3\cos(2\,x) + 5\,x\,e^{-2\,x}$$

3, Show that $y_1(x) = x^2$ and $y_2(x) = x - 1$ are solutions of $(x^2 - 2\,x)\,y'' + 2\,(1 - x)\,y' + 2\,y = 0$, use this to find the general solution of $(x^2 - 2\,x)\,y'' + 2\,(1 - x)\,y' + 2\,y = 6\,(x^2 - 2\,x)^2$

4, Find the general solution of the differential equation or the solution of the initial value problem

$$y\,y'' - 2\,(y')^2 = 0$$