Laplace transforms

Use the Laplace transform to solve the following IVPs.

1. $y'' - y' - 6y = 0,\ y(0) = 2,\ y'(0) = -1$
2. $y'' + 4y' + 4y = t^2,\ y(0) = 0,\ y'(0) = 0$
3. $y'' + y = \sqrt{2}\,\sin\left(\sqrt{2}\,t\right),\ y(0) = 10,\ y'(0) = 0$

ANSWERS

1. $y(t) = \dfrac{3}{5}e^{3t} + \dfrac{7}{5}e^{-2t}$
2. $y(t) = \dfrac{1}{4}t^2 - \dfrac{1}{2}t + \dfrac{3}{8} - \dfrac{1}{4}te^{-2t} - \dfrac{3}{8}e^{-2t}$
3. $y(x) = 10\cos t + 2\sin t - \sqrt{2}\ \sin\left(\sqrt{2}\,t\right)$