

Solve the following differential equations numerically using Scilab and also solve them analytically. Verify the analytical plot with the numerical plots.

1. $\frac{d^2 y}{dt^2} + \frac{dy}{dt} - 2y = 0; y(0) = 1, y'(0) = 2.$
2. $y'' + 2y' + 4y = 0; y(0) = 2, y'(0) = 1.$
3. $y'' + 4y' + 4y = 0; y(0) = 3, y'(0) = 1.$
4. $y'' - 2y' + 4.01y = 0; y(0) = 0, y'(0) = 2.$
5. $y'' - 4y' + 4y = 0; y(0) = 3, y'(0) = 1.$
6. $y'' + 4y' + 3y = 0; y(0) = 2, y'(0) = 1.$
7. $\frac{dy}{dt} = y + t^2; y_{(t=0)} = 2.$
8. $\frac{dy}{dx} = x(1 + y/2); y_{(x=0)} = 2.$
9. $\frac{dy}{dx} = y + 2x; y_{(x=0)} = 4.$
10. $\frac{dy}{dt} = y + 2\cos t; y_{(t=0)} = 3.$
11. $\frac{dy}{dt} = 2t - y; y_{(t=0)} = 2.$
12. $L \frac{di}{dt} + Ri = E(t); L = 0.01, R = 5, E(t) = 12, i_{(t=0)} = 0.$
13. $\frac{dy}{dt} = y^2 - y \sin t + \cos t; y_{(t=0)} = 0.$
14. $y'' = v(1 - y^2)y' - y; y(0) = -2.5, y'(0) = 2.5, c = 0.1, 0 < t < 500.$
15. $y'' = 3/2(y^2(t)); y_{(t=0)} = 4, y(1) = 1.$

try to solve and plot some more different type of differential equations yourself for practice.

All the Best.