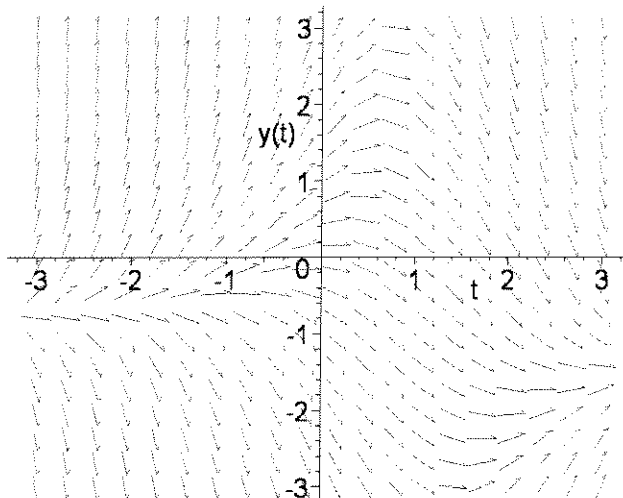


HW 12 B+C p. 74 1, 2, 3, 4, 5, 6, Maple 7, 10, 13, 14

3. a. $y' = -(y-1)(y-2)$ Equil at $y=1, y=2$. slope negative $y < 1$ or $y > 2$, slope positive $1 < y < 2$

7. $\rightarrow de := \text{diff}(y(t), t) = (1-t)*y(t) - t; \text{DEplot}(de, y(t), t = -3..3, y = -3..3);$

$$de := \frac{\partial}{\partial t} y(t) = (1-t)y(t) - t$$



B+C p. 129 1 $y' = -y, y(0) = 1, h = 0.1$ $y(x) = e^{-x}$

a. Euler

t	Actual	Euler	RK4
0	1	1	1
0.1	0.904837	0.9	0.904838
0.2	0.818731	0.81	0.818731
0.3	0.740818	0.729	0.740818
0.4	0.67032	0.6561	0.67032
0.5	0.606531	0.59049	0.606531
0.6	0.548812	0.531441	0.548812
0.7	0.496585	0.478297	0.496586
0.8	0.449329	0.430467	0.449329
0.9	0.40657	0.38742	0.40657
1	0.367879	0.348678	0.36788

11.3 2, 3, 5, 6, 7, 9, 11, 12, 17 $Z=10$

5 a. $y'' - 4y = 0, \lambda^2 - 4 = 0, y(x) = c_1 e^{2x} + c_2 e^{-2x}$

b. $y'' + 2y' + 4y = 0, \lambda^2 + 2\lambda + 4 = 0, \lambda = -1 \pm i\sqrt{3}, y(x) = e^{-x}(c_1 \cos(\sqrt{3}x) + c_2 \sin(\sqrt{3}x))$

c. $y'' + 9y = 0, \lambda^2 + 9 = 0, \lambda = \pm 3i, y(x) = c_1 \cos(3x) + c_2 \sin(3x)$

12 a. $x^2 y'' + xy' - 4y = 0, y = x^2 u, y' = x^2 u' + 2xu, y'' = x^2 u'' + 4xu' + 2u$

$\Rightarrow x^2(x^2 u'' + 4xu' + 2u) + x(x^2 u' + 2xu) - 4x^2 u = x^4 u'' + 5x^3 u' = 0 \therefore u'' + \frac{5}{x} u' = 0, w = u'$

$w' + \frac{5}{x} w = 0, \mu(x) = \exp \int \frac{5}{x} dx = x^5 \therefore \frac{d}{dx}(w x^5) = 0 \Rightarrow w(x) = c_1 x^{-5} = u' \Rightarrow u(x) = \hat{c}_1 x^{-4} + c_2$

$\therefore y(x) = x^2(\hat{c}_1 x^{-4} + c_2) = \hat{c}_1 x^{-2} + c_2 x^2$

15 + 25 = 40

8 + 15
7 + 10