1. Linear Systems of Two Ordinary Differential Equations

1.1. Systems of First-Order Ordinary Differential Equations

1. $x'_t = ax + by, \quad y'_t = cx + dy.$

2. $x'_t = a_1 x + b_1 y + c_1, \quad y'_t = a_2 x + b_2 y + c_2.$

3. $x'_t = f(t)x + g(t)y, \quad y'_t = g(t)x + f(t)y.$

4. $x'_t = f(t)x + g(t)y, \quad y'_t = -g(t)x + f(t)y.$

5. $x'_t = f(t)x + g(t)y, \quad y'_t = ag(t)x + [f(t) + bg(t)]y.$

6. $x'_t = f(t)x + g(t)y, \quad y'_t = a[f(t) + ah(t)]x + a[g(t) - h(t)]y.$

7. $x'_t = f(t)x + g(t)y, \quad y'_t = h(t)x + p(t)y.$

1.2. Systems of Second-Order Ordinary Differential Equations

8. $x''_{tt} = ax + by, \quad y''_{tt} = cx + dy.$

9. $x''_{tt} = a_1 x + b_1 y + c_1, \quad y''_{tt} = a_2 x + b_2 y + c_2.$

10. $x''_{tt} - ay'_t + bx = 0, \quad y''_{tt} + ax'_t + by = 0.$

11. $x''_{tt} + a_1 x'_t + b_1 y'_t + c_1 x + d_1 y = k_1 e^{i\omega t}, \quad y''_{tt} + a_2 x'_t + b_2 y'_t + c_2 x + d_2 y = k_2 e^{i\omega t}.$

12. $x''_{tt} = a(ty'_t - y), \quad y''_{tt} = b(tx'_t - x).$

13. $x''_{tt} = f(t)(a_1 x + b_1 y), \quad y''_{tt} = f(t)(a_2 x + b_2 y).$

14. $x''_{tt} = f(t)(a_1 x'_t + b_1 y'_t), \quad y''_{tt} = f(t)(a_2 x'_t + b_2 y'_t).$

15. $x''_{tt} = af(t)(ty'_t - y), \quad y''_{tt} = bf(t)(tx'_t - x).$

16. $t^2 x''_{tt} + a_1 tx'_t + b_1 ty'_t + c_1 x + d_1 y = 0, \quad t^2 y''_{tt} + a_2 tx'_t + b_2 ty'_t + c_2 x + d_2 y = 0.$

17. $(\alpha t^2 + \beta t + \gamma)^2 x''_{tt} = ax + by, \quad (\alpha t^2 + \beta t + \gamma)^2 y''_{tt} = cx + dy.$

18. $x''_{tt} = f(t)(tx'_t - x) + g(t)(ty'_t - y), \quad y''_{tt} = h(t)(tx'_t - x) + p(t)(ty'_t - y).$