ИДЗ 1 Дифференциальные уравнения высших порядков

Задача 1. Найти общее решение дифференциального уравнения.

1.1. $y''' x \ln x = y''$.

1.2. $xy''' + y'' = 1$.

1.3. $2xy''' = y''$.

1.4. $xy''' + y'' = x + 1$.

1.5. $\operatorname{tg} x \cdot y'' - y' + \dfrac{1}{\sin x} = 0$.

1.6. $x^2 y'' + xy' = 1$.

1.7. $y''' \operatorname{ctg} 2x + 2y'' = 0$.

1.8. $x^3 y''' + x^2 y'' = 1$.

1.9. $\operatorname{tg} x \cdot y''' = 2y''$.

1.10. $y''' \operatorname{cth} 2x = 2y''$.

1.11. $x^4 y'' + x^3 y' = 1$.

1.12. $xy''' + 2y'' = 0$.

1.13. $\left(1 + x^2\right) y'' + 2xy' = x^3$.

1.14. $x^5 y''' + x^4 y'' = 1$.

1.15. $xy''' - y'' + \dfrac{1}{x} = 0$.

1.16. $xy''' + y'' + x = 0$.

1.17. $\operatorname{th} x \cdot y^{IV} = y'''$.

1.18. $xy''' + y'' = \sqrt{x}$.

1.19. $y''' \operatorname{tg} x = y'' + 1$.

1.20. $y''' \operatorname{tg} 5x = 5y''$.

1.21. $y''' \operatorname{th} 7x = 7y''$.

1.22. $x^3 y''' + x^2 y'' = \sqrt{x}$.

1.23. $\operatorname{cth} x \cdot y'' - y' + \dfrac{1}{\operatorname{ch} x} = 0$.

1.24. $\left(x+1\right) y''' + y'' = \left(x+1\right)$.

1.25. $\left(1 + \sin x\right) y''' = \cos x \cdot y''$.

1.26. $xy''' + y'' = \dfrac{1}{\sqrt{x}}$.

1.27. $-xy''' + 2y'' = \dfrac{2}{x^2}$.

1.28. $\operatorname{cth} xy'' + y' = \operatorname{ch} x$.

1.29. $x^4 y'' + x^3 y' = 4$.

1.30. $y'' + \dfrac{2x}{x^2 + 1} y' = 2x$.

1.31. $\left(1 + x^2\right) y'' + 2xy' = 12x^3$.

1.32. $xy''' + 2y'' = 0$.

1.33. $2xy''' = y''$.

1.34. $\left(x+1\right) y''' + y'' = \left(x+1\right)$.

1.35. $xy''' - y'' + \dfrac{1}{x} = 0$.

1.36. $x^2 y'' + xy' = 1$.

1.37. $-xy''' + 2y'' = \dfrac{2}{x^2}$.

1.38. $xy''' + y'' = \sqrt{x}$.

1.39. $\operatorname{tg} x \cdot y''' = 2y''$.

1.40. $y'' + \dfrac{2x}{x^2 + 1} y' = 2x$.

Задача 2. Найти решение задачи Коши.

2.1. $4y^3 y'' = y^4 - 1$, $\quad y(0) = \sqrt{2}$, $\quad y'(0) = 1 / \left(2\sqrt{2}\right)$.

2.2. $y'' = 128 y^3$, $\quad y(0) = 1$, $\quad y'(0) = 8$.

2.3. $y'' y^3 + 64 = 0$, $\quad y(0) = 4$, $\quad y'(0) = 2$.

1

2.4. $y'' + 2\sin y\cos^3 y = 0$, $y(0) = 0$, $y'(0) = 1$.

2.5. $y'' = 32\sin^3 y\cos y$, $y(1) = \pi/2$, $y'(1) = 4$.

2.6. $y'' = 98y^3$, $y(1) = 1$, $y'(1) = 7$.

2.7. $y''y^3 + 49 = 0$, $y(3) = -7$, $y'(3) = -1$.

2.8. $4y^3 y'' = 16y^4 - 1$, $y(0) = \sqrt{2}/2$, $y'(0) = 1/\sqrt{2}$.

2.9. $y'' + 8\sin y\cos^3 y = 0$, $y(0) = 0$, $y'(0) = 2$.

2.01. $y'' = 72y^3$, $y(2) = 1$, $y'(2) = 6$.

2.11. $y''y^3 + 36 = 0$, $y(0) = 3$, $y'(0) = 2$.

2.12. $y'' = 18\sin^3 y\cos y$, $y(1) = \pi/2$, $y'(1) = 3$.

2.13. $4y^3 y'' = y^4 - 16$, $y(0) = 2\sqrt{2}$, $y'(0) = 1/\sqrt{2}$.

2.14. $y'' = 50y^3$, $y(3) = 1$, $y'(3) = 5$.

2.15. $y''y^3 + 25 = 0$, $y(2) = -5$, $y'(2) = -1$.

2.16. $y'' + 18\sin y\cos^3 y = 0$, $y(0) = 0$, $y'(0) = 3$.

2.17. $y'' = 8\sin^3 y\cos y$, $y(1) = \pi/2$, $y'(1) = 2$.

2.18. $y'' = 32y^3$, $y(4) = 1$, $y'(4) = 4$.

2.19. $y''y^3 + 16 = 0$, $y(1) = 2$, $y'(1) = 2$.

2.20. $y'' + 32\sin y\cos^3 y = 0$, $y(0) = 0$, $y'(0) = 4$.

2.21. $y'' = 50\sin^3 y\cos y$, $y(1) = \pi/2$, $y'(1) = 5$.

2.22. $y'' = 18y^3$, $y(1) = 1$, $y'(1) = 3$.

2.23. $y''y^3 + 9 = 0$, $y(1) = 1$, $y'(1) = 3$.

2.24. $y^3 y'' = 4(y^4 - 1)$, $y(0) = \sqrt{2}$, $y'(0) = \sqrt{2}$.

2.25. $y'' + 50\sin y\cos^3 y = 0$, $y(0) = 0$, $y'(0) = 5$.

2.26. $y'' = 8y^3$, $y(0) = 1$, $y'(0) = 2$.

2.27. $y''y^3 + 4 = 0$, $y(0) = -1$, $y'(0) = -2$.

2.28. $y'' = 2\sin^3 y\cos y$, $y(1) = \pi/2$, $y'(1) = 1$.

2.29. $y^3 y'' = y^4 - 16$, $y(0) = 2\sqrt{2}$, $y'(0) = \sqrt{2}$.

2.30. $y'' = 2y^3$, $y(-1) = 1$, $y'(-1) = 1$.

2.31. $y''y^3 + 1 = 0$, $y(1) = -1$, $y'(1) = -1$.

2.32. $y'' = 18\sin^3 y\cos y$, $y(1) = \pi/2$, $y'(1) = 3$.

2.33. $y''y^3 + 64 = 0$, $y(0) = 4$, $y'(0) = 2$.

2.34. $y^3 y'' = 4(y^4 - 1), \quad y(0) = \sqrt{2}, \quad y'(0) = \sqrt{2}.$

2.35. $y'' y^3 + 25 = 0, \quad y(2) = -5, \quad y'(2) = -1.$

2.36. $y'' = 98 y^3, \quad y(1) = 1, \quad y'(1) = 7.$

2.37. $y'' y^3 + 4 = 0, \quad y(0) = -1, \quad y'(0) = -2.$

2.38. $y'' = 32 y^3, \quad y(4) = 1, \quad y'(4) = 4.$

2.39. $y'' + 8 \sin y \cos^3 y = 0, \quad y(0) = 0, \quad y'(0) = 2.$

2.40. $y'' = 2 y^3, \quad y(-1) = 1, \quad y'(-1) = 1.$

Задача 3. Найти общее решение дифференциального уравнения.

3.1. $y''' + 3y'' + 2y' = 1 - x^2.$

3.2. $y''' - y'' = 6x^2 + 3x.$

3.3. $y''' - y' = x^2 + x.$

3.4. $y^{IV} - 3y''' + 3y'' - y' = 2x.$

3.5. $y^{IV} - y''' = 5(x+2)^2.$

3.6. $y^{IV} - 2y''' + y'' = 2x(1-x).$

3.7. $y^{IV} + 2y''' + y'' = x^2 + x - 1.$

3.8. $y^{V} - y^{IV} = 2x + 3.$

3.9. $3y^{IV} + y''' = 6x - 1.$

3.10. $y^{IV} + 2y''' + y'' = 4x^2.$

3.11. $y''' + y'' = 5x^2 - 1.$

3.12. $y^{IV} + 4y''' + 4y'' = x - x^2.$

3.13. $7y''' - y'' = 12x.$

3.14. $y''' + 3y'' + 2y' = 3x^2 + 2x.$

3.15. $y''' - y' = 3x^2 - 2x + 1.$

3.16. $y''' - y'' = 4x^2 - 3x + 2.$

3.17. $y^{IV} - 3y''' + 3y'' - y' = x - 3.$

3.18. $y^{IV} + 2y''' + y'' = 12x^2 - 6x.$

3.19. $y''' - 4y'' = 32 - 384x^2.$

3.20. $y^{IV} + 2y''' + y'' = 2 - 3x^2.$

3.21. $y''' + y'' = 49 - 24x^2.$

3.22. $y''' - 2y'' = 3x^2 + x - 4.$

3.23. $y''' - 13y'' + 12y' = x - 1.$

3.24. $y^{IV} + y''' = x.$

3.25. $y''' - y'' = 6x + 5.$

3.26. $y''' + 3y'' + 2y' = x^2 + 2x + 3.$

3.27. $y''' - 5y'' + 6y' = (x-1)^2.$

3.28. $y^{IV} - 6y''' + 9y'' = 3x - 1.$

3.29. $y''' - 13y'' + 12y' = 18x^2 - 39.$

3.30. $y^{IV} + y''' = 12x + 6.$

3.31. $y''' - 5y'' + 6y' = 6x^2 + 2x - 5.$

3.32. $y^{IV} + 4y''' + 4y'' = x - x^2.$

3.33. $y''' - y' = x^2 + x.$

3.34. $y^{IV} + y''' = x.$

3.35. $y''' - y' = 3x^2 - 2x + 1.$

3.36. $y^{IV} - 2y''' + y'' = 2x(1-x).$

3.37. $y''' - 5y'' + 6y' = (x-1)^2.$

3.38. $y^{IV} + 2y''' + y'' = 12x^2 - 6x.$

3.39. $3y^{IV} + y''' = 6x - 1.$

3.40. $y^{IV} + y''' = 12x + 6.$

Задача 4. Найти общее решение дифференциального уравнения.

4.1. $y''' - 4y'' + 5y' - 2y = (16 - 12x)e^{-x}.$

4.2. $y''' - 3y'' + 2y' = (1 - 2x)e^{x}.$

4.3. $y''' - y'' - y' + y = (3x + 7)e^{2x}.$

4.4. $y''' - 2y'' + y' = (2x+5)e^{2x}$.

4.5. $y''' - 3y'' + 4y = (18x-21)e^{-x}$.

4.6. $y''' - 5y'' + 8y' - 4y = (2x-5)e^{x}$.

4.7. $y''' - 4y'' + 4y' = (x-1)e^{x}$.

4.8. $y''' + 2y'' + y' = (18x+21)e^{2x}$.

4.9. $y''' + y'' - y' - y = (8x+4)e^{x}$.

4.10. $y''' - 3y' - 2y = -4x \cdot e^{x}$.

4.11. $y''' - 3y' + 2y = (4x+9)e^{2x}$.

4.12. $y''' + 4y'' + 5y' + 2y = (12x+16)e^{x}$.

4.13. $y''' - y'' - 2y' = (6x-11)e^{-x}$.

4.14. $y''' + y'' - 2y' = (6x+5)e^{x}$.

4.15. $y''' + 4y'' + 4y' = (9x+15)e^{x}$.

4.16. $y''' - 3y'' - y' + 3y = (4-8x)e^{x}$.

4.17. $y''' - y'' - 4y' + 4y = (7-6x)e^{x}$.

4.18. $y''' + 3y'' + 2y' = (1-2x)e^{-x}$.

4.19. $y''' - 5y'' + 7y' - 3y = (20-16x)e^{-x}$.

4.20. $y''' - 4y'' + 3y' = -4x \cdot e^{x}$.

4.21. $y''' - 5y'' + 3y' + 9y = (32x-32)e^{-x}$.

4.22. $y''' - 6y'' + 9y' = 4x \cdot e^{x}$.

4.23. $y''' - 7y'' + 15y' - 9y = (8x-12)e^{x}$.

4.24. $y''' - y'' - 5y' - 3y = -(8x+4)e^{x}$.

4.25. $y''' + 5y'' + 7y' + 3y = (16x+20)e^{x}$.

4.26. $y''' - 2y'' - 3y' = (8x-14)e^{-x}$.

4.27. $y''' + 2y'' - 3y' = (8x+6)e^{x}$.

4.28. $y''' + 6y'' + 9y' = (16x+24)e^{x}$.

4.29. $y''' - y'' - 9y' + 9y = (12-16x)e^{x}$.

4.30. $y''' + 4y'' + 3y' = 4(1-x)e^{-x}$.

4.31. $y''' + y'' - 6y' = (20x+14)e^{2x}$.

4.32. $y''' + 4y'' + 5y' + 2y = (12x+16)e^{x}$.

4.33. $y''' - y'' - y' + y = (3x+7)e^{2x}$.

4.34. $y''' - y'' - 5y' - 3y = -(8x+4)\mathrm{e}^x$.

4.35. $y''' + 4y'' + 4y' = (9x+15)\mathrm{e}^x$.

4.36. $y''' - 5y'' + 8y' - 4y = (2x-5)\mathrm{e}^x$.

4.37. $y''' + 2y'' - 3y' = (8x+6)\mathrm{e}^x$.

4.38. $y''' + 3y'' + 2y' = (1-2x)\mathrm{e}^{-x}$.

4.39. $y''' + y'' - y' - y = (8x+4)\mathrm{e}^x$.

4.40. $y''' + 4y'' + 3y' = 4(1-x)\mathrm{e}^{-x}$.

Задача 5. Найти общее решение дифференциального уравнения.

5.1. $y'' + 2y' = 4\mathrm{e}^x(\sin x + \cos x)$.　　　5.2. $y'' - 4y' + 4y = -\mathrm{e}^{2x}\sin 6x$.

5.3. $y'' + 2y' = -2\mathrm{e}^x(\sin x + \cos x)$.　　5.4. $y'' + y = 2\cos 7x + 3\sin 7x$.

5.5. $y'' + 2y' + 5y = -\sin 2x$.　　　　　5.6. $y'' - 4y' + 8y = \mathrm{e}^x(5\sin x - 3\cos x)$.

5.7. $y'' + 2y' = \mathrm{e}^x(\sin x + \cos x)$.　　　5.8. $y'' - 4y' + 4y = \mathrm{e}^{2x}\sin 3x$.

5.9. $y'' + 6y' + 13y = \mathrm{e}^{-3x}\cos 4x$.　　5.10. $y'' + y = 2\cos 3x - 3\sin 3x$.

5.11. $y'' + 2y' + 5y = -2\sin x$.　　　　5.12. $y'' - 4y' + 8y = \mathrm{e}^x(-3\sin x + 4\cos x)$.

5.13. $y'' + 2y' = 10\mathrm{e}^x(\sin x + \cos x)$.　　5.14. $y'' - 4y' + 4y = \mathrm{e}^{2x}\sin 5x$.

5.15. $y'' + y = 2\cos 5x + 3\sin 5x$.　　5.16. $y'' + 2y' + 5y = -17\sin 2x$.

5.17. $y'' + 6y' + 13y = \mathrm{e}^{-3x}\cos x$.　　5.18. $y'' - 4y' + 8y = \mathrm{e}^x(3\sin x + 5\cos x)$.

5.19. $y'' + 2y' = 6\mathrm{e}^x(\sin x + \cos x)$.　　5.20. $y'' - 4y' + 4y = -\mathrm{e}^{2x}\sin 4x$.

5.21. $y'' + 6y' + 13y = -\mathrm{e}^{3x}\cos 5x$.　　5.22. $y'' + y = 2\cos 7x - 3\sin 7x$.

5.23. $y'' + 2y' + 5y = -\cos x$.　　　　5.24. $y'' - 4y' + 8y = \mathrm{e}^x(2\sin x - \cos x)$.

5.25. $y'' + 2y' = 3\mathrm{e}^x(\sin x + \cos x)$.　　5.26. $y'' - 4y' + 4y = \mathrm{e}^{2x}\sin 4x$.

5.27. $y'' + 6y' + 13y = \mathrm{e}^{-3x}\cos 8x$.　　5.28. $y'' + 2y' + 5y = 10\cos x$.

5.29. $y'' + y = 2\cos 4x + 3\sin 4x$.　　5.30. $y'' - 4y' + 8y = \mathrm{e}^x(-\sin x + 2\cos x)$.

5.31. $y'' - 4y' + 4y = \mathrm{e}^{2x}\sin 6x$.　　5.32. $y'' - 4y' + 8y = \mathrm{e}^x(-3\sin x + 4\cos x)$.

5.33. $y'' + 2y' = -2\mathrm{e}^x(\sin x + \cos x)$.　　5.34. $y'' - 4y' + 8y = \mathrm{e}^x(2\sin x - \cos x)$.

5.35. $y'' + y = 2\cos 5x + 3\sin 5x$.　　5.36. $y'' - 4y' + 8y = \mathrm{e}^x(5\sin x - 3\cos x)$.

5.37. $y'' + 6y' + 13y = \mathrm{e}^{-3x}\cos 8x$.　　5.38. $y'' - 4y' + 8y = \mathrm{e}^x(3\sin x + 5\cos x)$.

5.39. $y'' + 6y' + 13y = \mathrm{e}^{-3x}\cos 4x$.　　5.40. $y'' - 4y' + 8y = \mathrm{e}^x(-\sin x + 2\cos x)$.

Задача 6. Найти общее решение дифференциального уравнения.

6.1. $y'' - 2y' = 2\operatorname{ch}2x$.　　　　　　6.2. $y'' + y = 2\sin x - 6\cos x + 2\mathrm{e}^x$.

6.3. $y''' - y' = 2\mathrm{e}^x + \cos x$.　　　　　6.4. $y'' - 3y' = 2\operatorname{ch}3x$.

6.5. $y'' + 4y = -8\sin 2x + 32\cos 2x + 4\mathrm{e}^{2x}$.　　6.6. $y''' - y' = 10\sin x + 6\cos x + 4\mathrm{e}^x$.

6.7. $y'' - 4y' = 16\operatorname{ch}4y.$

6.8. $y'' + 9y = -18\sin 3x - 18e^{3x}.$

6.9. $y''' - 4y' = 24e^{2x} - 4\cos 2x + 8\sin 2x.$

6.10. $y'' - 5y' = 50\operatorname{ch}5x.$

6.11. $y'' + 16y = 16\cos 4x - 16e^{4x}.$

6.12. $y''' - 9y' = -9e^{3x} + 18\sin 3x - 9\cos 3x.$

6.13. $y'' - y' = 2\operatorname{ch}x.$

6.14. $y'' + 25y = 20\cos 5x - 10\sin 5x + 50e^{5x}.$

6.15. $y''' - 16y' = 48e^{4x} + 64\cos 4x - 64\sin 4x.$

6.16. $y'' + 2y' = 2\operatorname{sh}2x.$

6.17. $y'' + 36y = 24\sin 6x - 12\cos 6x + 36e^{6x}.$

6.18. $y''' - 25y' = 25(\sin 5x + \cos 5x) - 50e^{5x}.$

6.19. $y'' + 3y' = 2\operatorname{sh}3x.$

6.20. $y'' + 49y = 14\sin 7x + 7\cos 7x - 98e^{7x}.$

6.21. $y''' - 36y' = 36e^{6x} - 72(\cos 6x + \sin 6x).$

6.22. $y'' + 4y' = 16\operatorname{sh}4x.$

6.23. $y'' + 64y = 16\sin 8x - 16\cos 8x - 64e^{8x}.$

6.24. $y''' - 49y' = 14e^{7x} - 49(\cos 7x + \sin 7x).$

6.25. $y'' + 5y' = 50\operatorname{sh}5x.$

6.26. $y'' + 81y = 9\sin 9x + 3\cos 9x + 162e^{9x}.$

6.27. $y''' - 64y' = 128\cos 8x - 64e^{8x}.$

6.28. $y'' + y' = 2\operatorname{sh}x.$

6.29. $y'' + 100y = 20\sin 10x - 30\cos 10x - 200e^{10x}.$

6.30. $y''' - 81y' = 162e^{9x} + 81\sin 9x.$

6.31. $y''' - 100y' = 20e^{10x} + 100\cos 10x.$

6.32. $y''' - 9y' = -9e^{3x} + 18\sin 3x - 9\cos 3x.$

6.33. $y''' - y' = 2e^x + \cos x.$

6.34. $y''' - 49y' = 14e^{7x} - 49(\cos 7x + \sin 7x).$

6.35. $y''' - 16y' = 48e^{4x} + 64\cos 4x - 64\sin 4x.$

6.36. $y''' - y' = 10\sin x + 6\cos x + 4e^x.$

6.37. $y''' - 64y' = 128\cos 8x - 64e^{8x}.$

6.38. $y''' - 25y' = 25(\sin 5x + \cos 5x) - 50e^{5x}.$

6.39. $y''' - 4y' = 24e^{2x} - 4\cos 2x + 8\sin 2x.$

6.40. $y''' - 81y' = 162e^{9x} + 81\sin 9x.$

Задача 7. Найти численное решение задачи Коши, сравнить его с аналитическим.

7.1. $y'' + \pi^2 y = \pi^2 / \cos \pi x, \quad y(0) = 3, \quad y'(0) = 0.$

7.2. $y'' + 3y' = 9e^{3x} / (1 + e^{3x}), \quad y(0) = \ln 4, \quad y'(0) = 3(1 - \ln 2).$

7.3. $y'' + 4y = 8\operatorname{ctg}2x, \quad y(\pi/4) = 5, \quad y'(\pi/4) = 4.$

7.4. $y'' - 6y' + 8y = 4 / (1 + e^{-2x}), \quad y(0) = 1 + 2\ln 2, \quad y'(0) = 6\ln 2.$

7.5. $y'' - 9y' + 18y = 9e^{3x} / (1 + e^{-3x}), \quad y(0) = 0, \quad y'(0) = 0.$

7.6. $y'' + \pi^2 y = \pi^2 / \sin \pi x = 1, \quad y(1/2), \quad y'(1/2) = \pi^2 / 2.$

7.7. $y'' + \dfrac{1}{\pi^2} y = \dfrac{1}{\pi^2 \cos(x/\pi)}, \quad y(0) = 2, \quad y'(0) = 0.$

7.8. $y'' - 3y' = \dfrac{9e^{-3x}}{3 + e^{-3x}}, \quad y(0) = 4\ln 4, \quad y'(0) = 3(3\ln 4 - 1).$

7.9. $y'' + y = 4\operatorname{ctg}x, \quad y(\pi/2) = 4, \quad y'(\pi/2) = 4.$

7.10. $y'' - 6y' + 8y = 4 / (2 + e^{-2x}), \quad y(0) = 1 + 3\ln 3, \quad y'(0) = 10\ln 3.$

7.11. $y'' + 6y' + 8y = 4e^{-2x} / (2 + e^{2x}), \quad y(0) = 0, \quad y'(0) = 0.$

7.12. $y'' + 9y = 9 / \sin 3x, \quad y(\pi/6) = 4, \quad y'(\pi/6) = 3\pi/2.$

6

7.13. $y'' + 9y = 9/\cos 3x$, $y(0) = 1$, $y'(0) = 0$.

7.14. $y'' - y' = e^{-x}/(2 + e^{-x})$, $y(0) = \ln 27$, $y'(0) = \ln 9 - 1$.

7.15. $y'' + 4y = 4ctg\,2x$, $y(\pi/4) = 3$, $y'(\pi/4) = 2$.

7.16. $y'' - 3y' + 2y = \dfrac{1}{3 + e^{-x}}$, $y(0) = 1 + 8\ln 2$, $y'(0) = 14\ln 2$.

7.17. $y'' - 6y' + 8y = 4e^{2x}/(1 + e^{-2x})$, $y(0) = 0$, $y'(0) = 0$.

7.18. $y'' + 16y = 16/\sin 4x$, $y(\pi/8) = 3$, $y'(\pi/8) = 2\pi$.

7.19. $y'' + 16y = 16/\cos 4x$, $y(0) = 3$, $y'(0) = 0$.

7.20. $y'' - 2y' = 4e^{-2x}/(1 + e^{-2x})$, $y(0) = \ln 4$, $y'(0) = \ln 4 - 2$.

7.21. $y'' + \dfrac{y}{4} = \dfrac{1}{4}ctg(x/2)$, $y(\pi) = 2$, $y'(\pi) = 1/2$.

7.22. $y'' - 3y' + 2y = 1/(2 + e^{-x})$, $y(0) = 1 + 3\ln 3$, $y'(0) = 5\ln 3$.

7.23. $y'' + 3y' + 2y = e^{-x}/(2 + e^{x})$, $y(0) = 0$, $y'(0) = 0$.

7.24. $y'' + 4y = 4/\sin 2x$, $y(\pi/4) = 2$, $y'(\pi/4) = \pi$.

7.25. $y'' + 4y = 4/\cos 2x$, $y(0) = 2$, $y'(0) = 0$.

7.26. $y'' + y' = e^{x}/(2 + e^{x})$, $y(0) = \ln 27$, $y'(0) = 1 - \ln 9$.

7.27. $y'' + y = 2ctg\,x$, $y(\pi/2) = 1$, $y'(\pi/2) = 2$.

7.28. $y'' - 3y' + 2y = 1/(1 + e^{-x})$, $y(0) = 1 + 2\ln 2$, $y'(0) = 3\ln 2$.

7.29. $y'' - 3y' + 2y = e^{x}/(1 + e^{-x})$, $y(0) = 0$, $y'(0) = 0$.

7.30. $y'' + y = 1/\sin x$, $y(\pi/2) = 1$, $y'(\pi/2) = \pi/2$.

7.31. $y'' + y = 1/\cos x$, $y(0) = 1$, $y'(0) = 0$.

7.32. $y'' + 9y = 9/\sin 3x$, $y(\pi/6) = 4$, $y'(\pi/6) = 3\pi/2$.

7.33. $y'' + 4y = 8ctg\,2x$, $y(\pi/4) = 5$, $y'(\pi/4) = 4$.

7.34. $y'' + 4y = 4/\sin 2x$, $y(\pi/4) = 2$, $y'(\pi/4) = \pi$.

7.35. $y'' + 4y = 4ctg\,2x$, $y(\pi/4) = 3$, $y'(\pi/4) = 2$.

7.36. $y'' + \pi^2 y = \pi^2/\sin \pi x = 1$, $y(1/2)$, $y'(1/2) = \pi^2/2$.

7.37. $y'' + y = 2ctg\,x$, $y(\pi/2) = 1$, $y'(\pi/2) = 2$.

7.38. $y'' + 16y = 16/\sin 4x$, $y(\pi/8) = 3$, $y'(\pi/8) = 2\pi$.

7.39. $y'' + y = 4ctg\,x$, $y(\pi/2) = 4$, $y'(\pi/2) = 4$.

7.40. $y'' + y = 1/\sin x$, $y(\pi/2) = 1$, $y'(\pi/2) = \pi/2$.