ДОМАШНЕЕ ЗАДАНИЕ ПО ТЕМЕ «ДИФФЕРЕНЦИАЛЬНЫЕ УРАВНЕНИЯ»

ЗАДАЧА 1

1. Найти общий интеграл дифференциального уравнения

1.1 $y' = \dfrac{(x^2+1)}{\cos y}$. 1.2 $y' = \text{tg}x\text{tg}y$. 1.3. $y' = e^y x^3$. 1.4. $y' = \dfrac{1}{x}\text{tg}y$.

1.5. $y' = \dfrac{(y^2-4)}{x^2-1}$. 1.6. $y' = \dfrac{y^2+4}{x^2+1}$. 1.7. $y' = \dfrac{xe^y}{x^2-1}$. 1.8. $y' = \dfrac{xe^y}{x^2+1}$.

1.9. $y' = \dfrac{e^y}{x^2-1}$. 1.10. $y' = \dfrac{e^y}{x^2+1}$. 1.11. $y' = \dfrac{\sqrt{y^2+1}}{x}$. 1.12. $y' = \dfrac{\sqrt{y^2-1}}{x}$.

1.13. $y' = \dfrac{\sqrt{1-y^2}}{x}$. 1.14. $y' = \sqrt{\dfrac{1-y^2}{1-x^2}}$. 1.15. $y' = \sqrt{\dfrac{y^2-1}{1-x^2}}$. 1.16. $y' = \sqrt{\dfrac{y^2-1}{x^2-1}}$.

1.17. $y' = \sqrt{\dfrac{1-y^2}{x^2-1}}$. 1.18. $y' = \sqrt{\dfrac{1-y^2}{1+x^2}}$. 1.19. $y' = \sqrt{\dfrac{y^2-1}{1+x^2}}$. 1.20. $y' = \sqrt{\dfrac{y^2+1}{1+x^2}}$.

1.21. $y' = \dfrac{e^y}{x^2+1}$. 1.22 $y' = \dfrac{e^y}{x^2-1}$. 1.23. $y' = \dfrac{xe^y}{x^2+1}$. 1.24. $y' = \dfrac{xe^y}{x^2-1}$.

1.25. $y' = \dfrac{y^2+4}{x^2+1}$. 1.26 $y' = \dfrac{(y^2-4)}{x^2-1}$. 1.27. $y' = \dfrac{1}{x}\text{tg}y$. 1.28. $y' = e^y x^3$.

1.29. $y' = c\text{tg}x\text{tg}y$. 1.30 $y' = \dfrac{(x^2+1)}{\cos 2y}$.

ЗАДАЧА 2

2. Найти общий интеграл дифференциального уравнения

2.1 $y' = \dfrac{y^2}{x^2} + 5\dfrac{y}{x} + 3$. 2.2 $y' = \dfrac{y^2}{x^2} + 5\dfrac{y}{x} + 4$. 2.3. $y' = \sqrt{\dfrac{y^2}{x^2}+1} + \dfrac{y}{x}$.

2.4. $y' = \dfrac{y^2}{x^2} + 6\dfrac{y}{x} + 6$. 2.5. $y' = \dfrac{y^2}{x^2} - 4\dfrac{y}{x} + 6$. 2.6. $y' = \sqrt{1-\dfrac{y^2}{x^2}} + \dfrac{y}{x}$.

2.7. $y' = \dfrac{y-x}{y+x} + \dfrac{y}{x}$. 2.8. $y' = \dfrac{y}{x} + \dfrac{y+2x}{2y+x}$. 2.9. $y' = \dfrac{y}{x} + \text{tg}\dfrac{y}{x}$.

2.10 . $y' = \dfrac{y-x}{y+2x} + \dfrac{y}{x}$. 2.11. $y' = \dfrac{y}{x} + e^{-\frac{y}{x}}$. 2.12. $y' = \dfrac{y}{x} + \sqrt{\dfrac{y^2}{x^2} + 4}$.

2.13. $y' = \dfrac{y}{x} + \sqrt{4 - \dfrac{y^2}{x^2}}$. 2.14. $y' = \dfrac{y^2}{x^2} + 6\dfrac{y}{x} + 4$. 2.15. $y' = \dfrac{y^2}{x^2} - 4\dfrac{y}{x} + 4$.

2.16. $y' = \dfrac{x^2}{x^2+y^2} + \dfrac{y}{x}$. 2.17. $y' = \dfrac{y^2}{x^2+y^2} + \dfrac{y}{x}$. 2.18 . $y' = \dfrac{y}{x} + \dfrac{y+2x}{2y+x}$.

2.19. $y' = \dfrac{y^2}{x^2} + 8\dfrac{y}{x} + 12$. 2.20. $y' = \dfrac{y^2}{x^2} + 8\dfrac{y}{x} + 10$. 2.21. $y' = \dfrac{y-x}{y+2x} + \dfrac{y}{x}$.

2. 22 $y' = \dfrac{y}{x} + \mathrm{tg}\dfrac{y}{x}$. 2.23. $y' = \dfrac{y}{x} + e^{\frac{y}{x}}$. 2.24. $y' = \dfrac{y-x}{y+x} + \dfrac{y}{x}$.

2.25. $y' = \sqrt{1 - \dfrac{y^2}{x^2}} + \dfrac{y}{x}$. 2. 26 $y' = \dfrac{y^2}{x^2} - 4\dfrac{y}{x} + 6$. 2.27. $y' = \dfrac{y^2}{x^2} + 6\dfrac{y}{x} + 6$.

2.28. $y' = \sqrt{\dfrac{y^2}{x^2} + 1} + \dfrac{y}{x}$. 2.29. $y' = \dfrac{y^2}{x^2} + 5\dfrac{y}{x} + 4$. 2. 30 $y' = \dfrac{y^2}{x^2} + 5\dfrac{y}{x} + 3$.

ЗАДАЧА 3

3. Найти решение задачи Коши

3.1. $y' + (\mathrm{tg}x)y = 2x\cos x$, $y(0)=1$.

3.2. $y' - 2xy = 2x^2 e^{x^2}$, $y(0)=0$.

3.3. $y' - \dfrac{y}{x} = x\sin x$, $y(0)=2$.

3.4. $y' - \dfrac{2x}{(x^2+1)}y = 3x^2(x^2+1)$, $y(0)=0$.

3.5. $y' - 2xy = e^{x^2}\sin x$, $y(0)=1$.

3.6. $y' + \dfrac{2y}{x} = \dfrac{\sin x}{x^2}$, $y(0)=1$.

3.7. $y' - 3x^2 y = 2xe^{x^3}$, $y(0)=0$.

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

3.9. $y' - (\mathrm{ctg}x)y = 2x^2\sin x$, $y\left(\dfrac{\pi}{2}\right)=0$.

3.10. $y' - (\mathrm{ctg}x)y = \sin 2x$, $y\left(\dfrac{\pi}{2}\right)=1$.

3.11. $y' + (\mathrm{tg}x)y = 2x\cos x$, $y(0)=0$.

3.12. $y' + (\mathrm{tg}x)y = 2x\sin x$, $y(0)=1$.

3.13. $y' - \dfrac{y}{x} = x\sin x$, $y\left(\dfrac{\pi}{2}\right)=2$.

3.14. $y' + \dfrac{y}{x} = \dfrac{\sin x}{x}$, $y\left(\dfrac{\pi}{2}\right)=1$.

3.15. $y' - \dfrac{2y}{x} = x^2\sin x$, $y\left(\dfrac{\pi}{2}\right)=1$.

3.16. $y' + \dfrac{2y}{x} = \dfrac{\sin x}{x^2}$, $y\left(\dfrac{\pi}{2}\right)=0$.

3.17. $y' + \dfrac{3y}{x} = x^2$, $y(1)=2$.

3.18. $y' + \dfrac{2y}{x} = \dfrac{\sin x}{x^2}$, $y\left(\dfrac{\pi}{2}\right)=0$.

3.19. $y' - \dfrac{e^x}{e^x + 1} y = (e^x + 1)$, $y(0)=1$.

3.20. $y' - \dfrac{2x}{x^2 + 4} y = x^2 + 4$, $y(1)=0$.

3.21. $y' - \text{ctg}xy = \sin 2x$, $y\left(\dfrac{\pi}{2}\right)=1$.

3.22. $y' - \text{ctg}xy = 2x^2 \sin x$, $y\left(\dfrac{\pi}{2}\right)=0$.

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

3.24. $y' - 3x^2 y = 2xe^{x^3}$, $y(0)=1$.

3.25. $y' - 2xy = e^{x^2} \cos x$, $y(0)=1$.

3.26. $y' - 2xy = e^{x^2} \sin x$, $y(0)=1$.

3.27. $y' - \dfrac{2x}{(x^2 + 1)} = 3x^2(x^2 + 1)$, $y(0)=0$.

3.28. $y' - \dfrac{2x}{x^2 + 1} y = 2x(x^2 + 1)$, $y(0)=2$.

3.29. $y' - 2xy = 2x^2 e^{x^2}$, $y(0)=0$.

3.30. $y' - 2xy = 3x^2 e^{x^2}$, $y(0)=1$.

ЗАДАЧА 4

4. Найти решение задачи Коши

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

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

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

4.4. $y' + y = \dfrac{3}{2} e^{-2x} y^2$, $y(0)=2$.

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

4.6. $y' + 2y = \dfrac{3}{2} e^{-x} y^2$, $y(0)=2$.

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

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

4.9. $y' + y = 3e^{-4x} y^3$, $y(0)=1$.

4.10. $y' + y = \dfrac{3}{4} e^{-4x} y^3$, $y(0)=2$.

4.11. $y' - \dfrac{y}{x} = \dfrac{3}{2y}$, $y(1)=1$.

4.12. $y' + \dfrac{y}{x + 1} = \dfrac{3}{2y}$, $y(0)=1$.

4.13. $y' + \dfrac{y}{x} = \dfrac{1}{2yx^2}$, $y(1)=1$.

4.14. $y' - \dfrac{2y}{x} = y^2$, $y(1)=1$.

4.15. $y' + \dfrac{2y}{x + 1} = y^2$, $y(0)=1$.

4.16. $y' - \dfrac{y}{x} = \sqrt{y}$, $y(2)=4$.

4.17. $y' - \dfrac{2y}{x} = 2x\sqrt{y}$, $y(1)=1$.

4.18. $y' - \dfrac{3y}{x} = x\sqrt{y}$, $y(1)=1$.

4.19. $y' - \dfrac{y}{x} = 3x\sqrt{y}$, $y(2)=16$.

4.20. $y' + \dfrac{3y}{x} = 2y^2$, $y(1)=1$.

4.21. $y' + y = \dfrac{3}{4} e^{-4x} y^3$, $y(0)=2$.

4.22. $y' + y = 3e^{-4x} y^3$, $y(0)=1$.

4.23. $2y' + 2y = e^{-2x}y^3$,   y(0)=2.

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

4.25. $2y' + 4y = 3e^{-x}y^2$,   y(0)=2.

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

4.27. $y' + y = \dfrac{3}{2}e^{-2x}y^2$,   y(0)=2.

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

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

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

ЗАДАЧА 5

5. Найти общее решение дифференциального уравнения

5.1. $y'' - \dfrac{y'}{x+1} = 3x + 3$.

5.11. $y'' - \dfrac{y'}{x+1} = 3x + 3$.

5.22. $y'' + \dfrac{y'}{x} = \dfrac{4}{x^4}$.

5.2. $y'' - \dfrac{y'}{x+1} = 8(x+1)^2$.

5.12. $y'' - \dfrac{y'}{x+1} = 8(x+1)^2$.

5.23. $y'' + \dfrac{y'}{x} = \dfrac{1}{x^3}$.

5.3. $y'' - \dfrac{y'}{x+1} = \dfrac{3}{(x+1)^3}$.

5.13. $y'' - \dfrac{y'}{x+1} = \dfrac{3}{(x+1)^3}$.

5.24. $y'' - \dfrac{y'}{x} = \dfrac{16}{x^3}$.

5.4. $y'' - \dfrac{y'}{x} = -\dfrac{2}{x^2}$.

5.14. $y'' - \dfrac{y'}{x+1} = -\dfrac{2}{(x+1)^2}$.

5.25. $y'' + \dfrac{y'}{x} = 9x$.

5.5. $y'' - \dfrac{y'}{x+1} = 4$.

5.15. $y'' + \dfrac{y'}{x+2} = 4$.

5.26. $y'' + \dfrac{y'}{x} = 4$.

5.6. $y'' + \dfrac{y'}{x+1} = 9(x+1)$.

5.16. $y'' + \dfrac{y'}{x+1} = 9(x+1)$.

5.27. $y'' - \dfrac{y'}{x} = -\dfrac{2}{x^2}$.

5.7. $y'' - \dfrac{y'}{x} = \dfrac{16}{x^3}$.

5.17. $y'' + \dfrac{y'}{x+1} = \dfrac{16}{(x+1)^3}$.

5.28. $y'' - \dfrac{y'}{x} = \dfrac{3}{x^3}$.

5.8. $y'' + \dfrac{y'}{x} = \dfrac{1}{x^3}$.

5.18. $y'' + \dfrac{y'}{x+1} = \dfrac{1}{(x+1)^3}$.

5.29. $y'' - \dfrac{y'}{x} = 8x^2$.

5.9. $y'' + \dfrac{y'}{x} = \dfrac{4}{x^4}$.

5.19. $y'' + \dfrac{y'}{x+1} = \dfrac{4}{(x+1)^4}$.

5.30. $y'' - \dfrac{y'}{x} = 3x$.

5.10. $y'' + \dfrac{y'}{x} = \dfrac{9}{4\sqrt{x}}$.

5.20. $y'' + \dfrac{y'}{x+1} = \dfrac{9}{4\sqrt{x+1}}$.

5.21. $y'' + \dfrac{y'}{x} = \dfrac{9}{4\sqrt{x}}$.

ЗАДАЧА 6

6. Найти решение задачи Коши.

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

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

6.3. $y'' = 2y^3$, $\quad y(2) = \dfrac{1}{2}$, $y'(2) = -\dfrac{1}{4}$.

6.4. $y'' = 6y^2$, $y(1)=1$, $y'(1) = 2$.

6.5. $y'' = 6y^2$, $\quad y(0)=1$, $y'(0) = -2$.

6.6. $y'' = 6y^2$, $\quad y(2) = \dfrac{1}{4}$, $y'(2) = -\dfrac{1}{4}$.

6.7. $y'' = \dfrac{1}{2}y^3$, $\quad y(1)=2$, $y'(1) = -2$.

6.8. $y'' = \dfrac{1}{2}y^3$, $y(0)=2$,

6.9. $y'' + \dfrac{1}{4y^3} = 0$, $\quad y(1)=2$, $y'(1) = -4$.

6.10. $y'' = 3y^2$, $y(0)=2$, $y'(0) = -4$.

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

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

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

6.14. $\quad y'' + 8\sin y \cos^3 y = 0$, $\quad y(1)=0$,
$y'(1) = 2$.

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

6.16. $y'' + 8\sin y \cos^3 y = 0$, $y(1)=0$, $y'(1) = -2$.

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

6.18. $y'' + 2\sin y \cos^3 y = 0$, $y(0) =2$, $y'(0) =4$.

6.19. $y'' + \dfrac{1}{4y^3} = 0$, $y(1)=1$, $y'(1) = \dfrac{1}{2}$.

6.20. $y'' + \dfrac{1}{4y^3} = 0$, $y(2)=1$, $y'(2) = \dfrac{1}{2}$.

6.21. $y'' = 3y^2$, $y(0)=2$, $y'(0) = -4$.

6.22. $y'' = 3y^2$, $y(1)=2$, $y'(1) = -4$.

6.23. $y'' = \dfrac{1}{2}y^3$, $y(0)=2$, $y'(0) = -2$.

6.24. $y'' = \dfrac{1}{2}y^3$, $y(1)=2$, $y'(1) = -2$.

6.25. $y'' = 6y^2$, $y(2) = \dfrac{1}{4}$, $y'(2) = -\dfrac{1}{4}$.

6.26. $y'' = 6y^2$, $y(0)=1$, $y'(0) = -2$.

6.27. $y'' = 6y^2$, $y(1)=1$, $y'(1) = -2$.

6.28. $y'' = 2y^3$, $y(2) = \dfrac{1}{2}$, $y'(2) = -\dfrac{1}{4}$.

6.29. $y'' = 2y^3$, $y(0)=1$, $y'(0) = -1$.

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

ЗАДАЧА 7

7. Найти решение задачи Коши.

7.1 $\quad y'' + y = \dfrac{1}{\sin x}$, $y\left(\dfrac{\pi}{2}\right) = 0$, $\quad y'\left(\dfrac{\pi}{2}\right) = \dfrac{\pi}{2}$.

7.2 $\quad y'' + y = \dfrac{1}{\sin x}$, $\quad y\left(\dfrac{\pi}{2}\right) = 0$, $\quad y'\left(\dfrac{\pi}{2}\right) = \dfrac{\pi}{2} + 1$.

7.3 $\quad y'' + 4y = \dfrac{4}{\sin 2x}$, $\quad y\left(\dfrac{\pi}{4}\right) = 0$, $\quad y'\left(\dfrac{\pi}{4}\right) = \dfrac{\pi}{2}$.

7.4 . $y'' + y = \dfrac{4}{\sin 2x}$, $y\left(\dfrac{\pi}{4}\right) = 1$, $\quad y'\left(\dfrac{\pi}{4}\right) = \dfrac{\pi}{2}$.

7.5. $y'' + 9y = \dfrac{9}{\sin 3x}$, $y\left(\dfrac{\pi}{6}\right) = 1$, $\quad y'\left(\dfrac{\pi}{6}\right) = \dfrac{\pi}{2}$.

7.6 $y'' + 9y = \dfrac{9}{\sin 3x}$, $y\left(\dfrac{\pi}{6}\right) = 0$, $y'\left(\dfrac{\pi}{6}\right) = \dfrac{\pi}{2} + 3$.

7.7 $y'' + 16y = \dfrac{16}{\sin 4x}$, $y\left(\dfrac{\pi}{8}\right) = 0$, $y'\left(\dfrac{\pi}{8}\right) = \dfrac{\pi}{2}$.

7.8 $y'' + 16y = \dfrac{16}{\sin 4x}$, $y\left(\dfrac{\pi}{8}\right) = 1$, $y'\left(\dfrac{\pi}{8}\right) = \dfrac{\pi}{2}$

7.9. $y'' + \pi^2 y = \dfrac{\pi^2}{\sin \pi x}$, $y\left(\dfrac{1}{2}\right) = 0$, $y'\left(\dfrac{1}{2}\right) = \dfrac{\pi}{2}$.

7.10. $y'' + \pi^2 y = \dfrac{\pi^2}{\sin \pi x}$, $y\left(\dfrac{1}{2}\right) = 2$, $y'\left(\dfrac{1}{2}\right) = \dfrac{\pi}{2}$.

7.11. $y'' + y = \dfrac{1}{\cos x}$, $y(0) = 0$, $y'(0) = 0$.

7.12 $y'' + y = \dfrac{1}{\cos x}$, $y(0) = 1$, $y'(0) = 0$.

7.13. $y'' + y = \dfrac{1}{\cos x}$, $y(0) = 0$, $y'(0) = 1$.

7.14. $y'' + 4y = \dfrac{4}{\cos 2x}$, $y(0) = 0$, $y'(0) = 0$.

7.15. $y'' + 4y = \dfrac{4}{\cos 2x}$, $y(0) = 1$, $y'(0) = 0$.

7.16. $y'' + 4y = \dfrac{4}{\cos 2x}$, $y(0) = 0$, $y'(0) = 4$.

7.17. $y'' + 4y = \dfrac{4}{\cos 2x}$, $y(0) = 2$, $y'(0) = 6$.

7.18. $y'' + y = \dfrac{1}{\cos 2x}$, $y(0) = 2$, $y'(0) = 4$.

7.19. $y'' + 9y = \dfrac{1}{\cos 3x}$, $y(0) = 0$, $y'(0) = 0$.

7.20. $y'' + 9y = \dfrac{1}{\cos 3x}$, $y(0) = 1$, $y'(0) = 6$.

7.21. $y'' + y = \operatorname{tg} x$, $y(0) = 0$, $y'(0) = -1$.

7.22. $y'' + y = \operatorname{tg} x$, $y(0) = 1$, $y'(0) = -1$.

7.23. $y'' + y = \operatorname{tg} x$, $y(0) = 0$, $y'(0) = 2$.

7.24. $y'' + y = \operatorname{tg} x$, $y(0) = 2$, $y'(0) = 4$.

7.25. $y'' + 4y = 4\operatorname{tg} 2x$, $y(0) = 0$, $y'(0) = -2$.

7.26. $y'' + 4y = 4\operatorname{tg} 2x$, $y(0) = 1$, $y'(0) = -2$.

7.27. $y'' + 4y = 4\operatorname{tg} 2x$, $y(0) = 0$, $y'(0) = 4$.

7.28. $y'' + 4y = 4\operatorname{tg} 2x$, $y(0) = 2$, $y'(0) = 4$.

7.29. $y'' + 9y = 9\mathrm{tg}3x$, $y(0) = 0$, $y'(0) = -3$.

7.30. $y'' + 9y = 9\mathrm{tg}3x$, $y(0) = 3$, $y'(0) = -3$.

ЗАДАЧА 8

8.Найти общее решение дифференциального уравнения.

8.1. $y'' - 6y' + 8y = 8x^2 - 12x + 2$.   8.2. $y'' - 6y' + 8y = 8x - 6$.

8.3. $y'' - 6y' + 5y = 5x^2 - 12x + 2$.   8.4. $y'' - 6y' + 5y = 5x - 6$.

8.5. $y'' - 6y' + 9y = 9x^2 - 12x + 2$.   8.6. $y'' - 6y' + 9y = 9x - 6$.

8.7. $y'' - 6y' + 10y = 10x^2 - 12x + 2$.   8.8. $y'' - 6y' + 10y = 10x - 6$.

8.9. $y'' - 6y' + 13y = 13x^2 - 12x + 2$.   8.10. $y'' - 6y' + 13y = 13x - 6$.

8.11. $y'' + 6y' + 8y = 8x^2 + 12x + 2$.   8.12. $y'' + 6y' + 8y = 8x + 6$.

8.13. $y'' + 6y' + 5y = 5x^2 + 12x + 2$.   8.14. $y'' + 6y' + 5y = 8x + 6$.

8.15. $y'' + 6y' + 9y = 9x^2 + 12x + 2$.   8.16. $y'' + 6y' + 9y = 9x + 6$.

8.17. $y'' + 6y' + 10y = 10x^2 + 12x + 2$.   8.18. $y'' + 6y' + 10y = 10x + 6$.

8.19. $y'' + 6y' + 13y = 13x^2 + 12x + 2$.   8.20. $y'' + 6y' + 13y = 13x + 6$.

8.21. $y'' - 4y' + 3y = 3x^2 - 8x + 2$.   8.22. $y'' - 4y' + 3y = 3x - 4$.

8.23. $y'' + 4y' + 3y = 3x^2 + 8x + 2$.   8.24. $y'' + 4y' + 3y = 3x + 4$.

8.25. $y'' - 4y' + 4y = 4x^2 - 8x + 2$.   8.26. $y'' - 4y' + 4y = 4x - 4$.

8.27. $y'' + 4y' + 4y = 4x^2 + 8x + 2$.   8.28. $y'' + 4y' + 4y = 4x + 4$.

8.29. $y'' + 4y' + 5y = 5x^2 + 8x + 2$.   8.30. $y'' + 4y' + 5y = 5x + 4$.

ЗАДАЧА 9

9.Найти решение задачи Коши

9.1. $y'' - 8y' + 12y = (5x - 6)e^x - 4e^{2x}$, $y(0) = 0$, $y'(0) = 0$.

9.2. $y'' + 8y' + 12y = (21x - 10)e^x + 4e^{-2x}$, $y(0) = 0$, $y'(0) = 0$.

9.3. $y'' - 8y' + 15y = (8x - 6)e^x - 4e^{3x}$, $y(0) = 0$, $y'(0) = 0$.

9.4. $y'' - 8y' + 15y = (24x + 10)e^x + 2e^{-3x}$, $y(0) = 0$, $y'(0) = 0$.

9.5. $y'' - 8y' + 7y = (-5x - 4)e^{2x} + 6e^{7x}$, $y(0) = 0$, $y'(0) = 0$.

9.6. $y'' + 8y' + 7y = (27x + 12)e^{2x} - 6e^{-7x}$ $y(0) = 0$, $y'(0) = 0$.

9.7. $y'' - 8y' + 16y = (4x - 4)e^{2x} + 9e^x$, $\quad y(0) = 0$, $y'(0) = 0$.

9.8. $y'' + 8y' + 16y = (36x + 12)e^{2x} + 25e^x$, $y(0) = 0$, $y'(0) = 0$.

9.9. $y'' - 8y' + 17y = (10x - 6)e^x + 26e^{-x}$, $y(0) = 0$, $y'(0) = 0$.

9.10. $y'' + 8y' + 17y = (26x + 10)e^x + 10e^{-x}$, $y(0) = 0$, $y'(0) = 0$.

9.11. $y'' - 10y' + 9y = (20x - 12)e^{-x} - 8e^x$, $y(0) = 0$, $y'(0) = 0$.

9.12. $y'' + 10y' + 9y = (20x + 12)e^x + 8e^{-x}$, $y(0) = 0$, $y'(0) = 0$.

9.13. $y'' - 10y' + 16y = (7x - 8)e^x - 6e^{2x}$, $\quad y(0) = 0$, $y'(0) = 0$.

9.14. $y'' + 10y' + 16y = (7x + 8)e^{-x} + 6e^{-2x}$, $y(0) = 0$, $y'(0) = 0$.

9.15. $y'' - 10y' + 24y = (15x - 8)e^x - 2e^{4x}$, $y(0) = 0$, $y'(0) = 0$.

9.16. $y'' + 10y' + 24y = (15x + 8)e^{-x} + 2e^{-4x}$, $y(0) = 0$, $y'(0) = 0$.

9.17. $y'' - 10y' + 25y = (16x - 8)e^x + 36e^{-x}$, $y(0) = 0$, $y'(0) = 0$.

9.18. $y'' + 10y' + 25y = (16x + 8)e^{-x} + 36e^x$, $y(0) = 0$, $y'(0) = 0$.

9.19. $y'' - 10y' + 26y = (17x - 8)e^x + 37e^{-x}$, $y(0) = 0$, $y'(0) = 0$.

9.20. $y'' + 10y' + 26y = (17x + 8)e^{-x} + 37e^x$, $y(0) = 0$, $y'(0) = 0$.

9.21. $y'' - 6y' + 5y = (-3x - 2)e^{2x} - 8e^x$, $\quad y(0) = 0$, $y'(0) = 0$.

9.22. $y'' + 6y' + 5y = (-3x + 2)e^{-2x} + 8e^x$, $\quad y(0) = 0$, $y'(0) = 0$.

9.23. $y'' - 6y' + 8y = (3x - 4)e^x - 4e^{2x}$, $\quad y(0) = 0$, $y'(0) = 0$

9.24. $y'' + 6y' + 8y = (3x + 4)e^{-x} + 12e^{-2x}$, $y(0) = 0$, $y'(0) = 0$.

9.25. $y'' - 6y' + 9y = (4x - 4)e^x + 16e^{-x}$, $\quad y(0) = 0$, $y'(0) = 0$.

9.26. $y'' + 6y' + 9y = (12x + 12)e^{-x} + 32e^x$, $y(0) = 0$, $y'(0) = 0$.

9.27. $y'' - 6y' + 10y = (5x - 4)e^x + 17e^{-x}$, $\quad y(0) = 0$, $y'(0) = 0$.

9.28. $y'' + 6y' + 10y = (15x + 12)e^{-x} - 34e^x$, $y(0) = 0$, $y'(0) = 0$.

9.29. $y'' - 6y' + 13y = (8x - 4)e^x + 20e^{-x}$, $\quad y(0) = 0$, $y'(0) = 0$.

9.30. $y'' + 6y' + 13y = (24x + 12)e^{-x} + 40e^x$, $y(0) = 0$, $y'(0) = 0$.

ЗАДАЧА 10

10. Найти общее решение дифференциального уравнения

10.1. $y'' + 2y' + y = 4\sin x$.

10.2. $y'' + 2y' + y = 4\cos x$.

10.3. $y'' + 2y' + y = 4\sin x + 6\cos x$.

10.4. $y'' + 5y' + 4y = 10\sin 2x$.

10.5. $y'' + 5y' + 4y = 20\cos 2x$.

10.6. $y'' + 5y' + 4y = 20\sin 2x + 30\cos 2x$.

10.7. $y'' + 6y' + 25y = 30\sin 5x$.

10.8. $y'' + 6y' + 25y = 60\cos 5x$.

10.9. $y'' + 6y' + 25y = 90\sin 5x + 30\cos 5x$.

10.10. $y'' - 5y' + 4y = 20\sin 2x$.

10.11. $y'' - 5y' + 4y = 40\cos 2x$.

10.12. $y'' - 5y' + 4y = 60\sin 2x + 30\cos 2x$.

10.13. $y'' - 6y' + 25y = 60\sin 5x$.

10.14. $y'' - 6y' + 25y = 30\cos 5x$.

10.15. $y'' - 6y' + 25y = 90\sin 5x + 60\cos 5x$.

10.16. $y'' - 8y' + 12y = 11\sin x - 8\cos x$.

10.17. $y'' - 8y' + 12y = 8\sin x + 11\cos x$.

10.18. $y'' - 8y' + 12y = 27\sin x + 14\cos x$.

10.19. $y'' + 4y' + 5y = 4\sin x + 4\cos x$.

10.20. $y'' + 4y' + 5y = 4\cos x - 4\sin x$.

10.21. $y'' + 4y' + 5y = 8\cos x$.

10.22. $y'' - 4y' + 5y = \sin x - 8\cos x$.

10.23. $y'' - 4y' + 5y = 8\sin x + \cos x$.

10.24. $y'' - 4y' + 5y = 17\sin x - 6\cos x$.

10.25. $y'' + 4y' + 4y = -8\cos 2x$.

10.26. $y'' + 4y' + 4y = 16\sin 2x$.

10.27. $y'' + 4y' + 4y = 8\sin 2x + 16\cos 2x$.

10.28. $y'' + 2y' + 2y = 4\cos 2x - 2\sin 2x$.

10.29. $y'' + 2y' + 2y = 4\sin 2x + 2\cos 2x$.

10.30. $y'' + 2y' + y = 10\cos 2x$.

ЗАДАЧА 11

11. Найти общее решение дифференциального уравнения

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

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

11.3. $y''' - y'' - y' + y = 2x - 2$.

11.4. $y''' - y'' - y' + y = x^2 - 4$.

11.5. $y''' - y'' - y' + y = x^3 - 6x$.

11.6. $y''' - 3y'' + 3y' - y = x^3 - 9x^2 + 18x - 6$.

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

11.8. $y''' - 3y'' + 3y' - y = 2x - 6$.

11.9. $y''' - 3y'' + 3y' - y = x^2 - 12$.

11.10. $y''' - 3y'' + 3y' - y = x^3 - 36x + 48$.

11.11. $y''' - 4y'' + 5y' - 2y = 2x^3 - 15x^2 + 24x - 6$.

11.12. $y''' - 4y'' + 5y' - 2y = 2x^2 - 10x + 8$.

11.13. $y''' - 4y'' + 5y' - 2y = 2x - 5$.

11.14. $y''' - 4y'' + 5y' - 2y = 2x^2 - 17$.

11.15. $y''' - 4y'' + 5y' - 2y = 2x^3 - 9x^2 - 6x + 18$.

11.16. $y''' - 2y'' - y' + 2y = 2x^3 - 3x^2 - 12x + 6$.

11.17. $y''' - 2y'' - y' + 2y = 2x^2 - 2x - 4$.

11.18. $y''' - 2y'' - y' + 2y = 2x - 1$.

11.19. $y''' - 2y'' - y' + 2y = 2x^2 - 5$.

11.20. $y''' - 2y'' - y' + 2y = 2x^3 - 3x^2$.

11.21. $y''' - y'' - 4y' + 4y = 4x^3 - 12x^2 - 6x + 6$.

11.22. $y''' - y'' - 4y' + 4y = 4x^2 - 8x - 2$.

11.23. $y''' - y'' - 4y' + 4y = 4x - 4$.

11.24. $y''' - y'' - 4y' + 4y = 4x^2 - 10$.

11.25. $y''' - y'' - 4y' + 4y = 4x^3 - 30x$.

11.26. $y''' + 2y'' - y' - 2y = 2x^3 + 3x^2 - 12x - 6$.

11.27. $y''' + 2y'' - y' - 2y = 2x^2 + 2x - 4$.

11.28. $y''' + 2y'' - y' - 2y = 2x + 1$.

11.29. $y''' + 2y'' - y' - 2y = 2x^2 - 5$.

11.30. $y''' + 2y'' - y' - 2y = 2x^3 + 3x^2$.

ЗАДАЧА 12

12. Найти решение системы дифференциальных уравнений, удовлетворяющее начальным условиям

12.1. $\begin{cases} \dfrac{dx}{dt} = 3x - 2y, \\ \dfrac{dy}{dt} = -x + 2y, \end{cases}$ x(0)=1, y(0)=1.

12.2. $\begin{cases} \dfrac{dx}{dt} = 2x - y, \\ \dfrac{dy}{dt} = 3x - 2y, \end{cases}$ x(0)=1, y(0)=1.

12.3. $\begin{cases} \dfrac{dx}{dt} = 3x - y, \\ \dfrac{dy}{dt} = 4x - 2y, \end{cases}$ x(0)=1, y(0)=1.

12.4. $\begin{cases} \dfrac{dx}{dt} = 4x - 2y, \\ \dfrac{dy}{dt} = x + y, \end{cases}$ x(0)=1, y(0)=1.

12.5. $\begin{cases} \dfrac{dx}{dt} = x - 2y, \\ \dfrac{dy}{dt} = 2x - 3y, \end{cases}$ x(0)=1, y(0)=1.

12.6. $\begin{cases} \dfrac{dx}{dt} = 2x - 3y, \\ \dfrac{dy}{dt} = 3x - 4y, \end{cases}$ x(0)=1, y(0)=1.

12.7. $\begin{cases} \dfrac{dx}{dt} = x - 3y, \\ \dfrac{dy}{dt} = -x - y, \end{cases}$ x(0)=1, y(0)=1.

12.8. $\begin{cases} \dfrac{dx}{dt} = 2x - 4y, \\ \dfrac{dy}{dt} = x - 3y, \end{cases}$ x(0)=1, y(0)=1.

12.9. $\begin{cases} \dfrac{dx}{dt} = x + 2y, \\ \dfrac{dy}{dt} = 2x + 2y, \end{cases}$ x(0)=1, y(0)=1.

12.10. $\begin{cases} \dfrac{dx}{dt} = 4x - y, \\ \dfrac{dy}{dt} = 2x + y, \end{cases}$ x(0)=1, y(0)=1.

12.11. $\begin{cases} \dfrac{dx}{dt} = 2x + y, \\ \dfrac{dy}{dt} = 2x + 3y, \end{cases}$ x(0)=1, y(0)=−1.

12.12. $\begin{cases} \dfrac{dx}{dt} = 3x + 2y, \\ \dfrac{dy}{dt} = 3x + 4y, \end{cases}$ x(0)=1, y(0)=−1.

12.13. $\begin{cases} \dfrac{dx}{dt} = x + 2y, \\ \dfrac{dy}{dt} = -2x - 3y, \end{cases}$ x(0)=1, y(0)=−1.

12.14. $\begin{cases} \dfrac{dx}{dt} = 2x + 3y, \\ \dfrac{dy}{dt} = -3x - 4y, \end{cases}$ x(0)=1, y(0)=−1.

12.15. $\begin{cases} \dfrac{dx}{dt} = x - y, \\ \dfrac{dy}{dt} = x + 3y, \end{cases}$ x(0)=1, y(0)=−1.

12.16. $\begin{cases} \dfrac{dx}{dt} = 3x + y, \\ \dfrac{dy}{dt} = x + 3y, \end{cases}$ x(0)=1, y(0)=−1.

12.17. $\begin{cases} \dfrac{dx}{dt} = -x + y, \\ \dfrac{dy}{dt} = -x - 3y, \end{cases}$ x(0)=1, y(0)=−1.

12.18. $\begin{cases} \dfrac{dx}{dt} = -3x - y, \\ \dfrac{dy}{dt} = -x - 3y, \end{cases}$ x(0)=1, y(0)=−1.

12.19. $\begin{cases} \dfrac{dx}{dt} = 4x + y, \\ \dfrac{dy}{dt} = -2x + y, \end{cases}$ x(0)=1, y(0)=−1.

12.20. $\begin{cases} \dfrac{dx}{dt} = -4x - y, \\ \dfrac{dy}{dt} = 2x - y, \end{cases}$ x(0)=1, y(0)=−1.

12.21. $\begin{cases} \dfrac{dx}{dt} = 4x - 6y, \\ \dfrac{dy}{dt} = x - y, \end{cases}$ x(0)=2, y(0)=1.

12.22. $\begin{cases} \dfrac{dx}{dt} = 2x - 2y, \\ \dfrac{dy}{dt} = 3x - 5y, \end{cases}$

$x(0)=2,\ y(0)=1.$

12.23. $\begin{cases} \dfrac{dx}{dt} = 3x - 2y, \\ \dfrac{dy}{dt} = 2x - 2y, \end{cases}$

$x(0)=2,\ y(0)=1.$

12.24. $\begin{cases} \dfrac{dx}{dt} = -3x + 2y, \\ \dfrac{dy}{dt} = -2x + 2y, \end{cases}$

$x(0)=2,\ y(0)=1.$

12.25. $\begin{cases} \dfrac{dx}{dt} = x + 4y, \\ \dfrac{dy}{dt} = x - y, \end{cases}$

$x(0)=2,\ y(0)=1.$

12.26. $\begin{cases} \dfrac{dx}{dt} = -x - 4y, \\ \dfrac{dy}{dt} = -x + y, \end{cases}$

$x(0)=2,\ y(0)=1.$

12.27. $\begin{cases} \dfrac{dx}{dt} = x + 2y, \\ \dfrac{dy}{dt} = 3x - 2y, \end{cases}$

$x(0)=2,\ y(0)=1.$

12.28. $\begin{cases} \dfrac{dx}{dt} = -x - 2y, \\ \dfrac{dy}{dt} = -3x + 2y, \end{cases}$

$x(0)=2,\ y(0)=1.$

12.29. $\begin{cases} \dfrac{dx}{dt} = x + y, \\ \dfrac{dy}{dt} = 4x - 2y, \end{cases}$

$x(0)=1,\ y(0)=1.$

12.30. $\begin{cases} \dfrac{dx}{dt} = x + 3y, \\ \dfrac{dy}{dt} = 3x + y, \end{cases}$

$x(0)=1,\ y(0)=1.$