6. Варианты домашнего задания № 4

Задача 1. Для чисел z_1 и z_2 вычислить:

а) сумму $z_1 + z_2$ и разность $z_1 - z_2$ в алгебраической форме; б) произведение $z_1 \cdot z_2$ и частное $\frac{z_1}{z_2}$ в тригонометрической форме. Результаты изобразить графически.

Варианты.

1. $z_1 = 1 + i,\ z_2 = -3 - 3i;$
2. $z_1 = 2 - 2i,\ z_2 = 6i;$
3. $z_1 = -1 - i,\ z_2 = 1;$
4. $z_1 = -2 - 2i,\ z_2 = i;$
5. $z_1 = -1 - i,\ z_2 = 2 + 2i;$
6. $z_1 = 4 + 4i,\ z_2 = -3 - 3i;$
7. $z_1 = -2 + 2i,\ z_2 = 1 - i;$
8. $z_1 = 8 + 8i,\ z_2 = -2 - 2i;$
9. $z_1 = 1 + i,\ z_2 = -2 + 2i;$
10. $z_1 = 1 - i,\ z_2 = 3 + 3i;$
11. $z_1 = 8 - 8i,\ z_2 = 6i;$
12. $z_1 = 4 - 4i,\ z_2 = -1 + i;$
13. $z_1 = 9 - 9i,\ z_2 = 5;$
14. $z_1 = 1 - i,\ z_2 = 2i;$
15. $z_1 = 2 + 2i,\ z_2 = 5 - 5i;$
16. $z_1 = -i,\ z_2 = 5 + 5i;$
17. $z_1 = -64 + 64i,\ z_2 = 1 - i;$

21. $z_1 = -4 + 4i,\ z_2 = 1 - i$
22. $z_1 = 3 - 3i,\ z_2 = 5 + 5i$
23. $z_1 = 2 + 2i,\ z_2 = -i$
24. $z_1 = -8 + 8i,\ z_2 = 5 + 5i$
25. $z_1 = \sqrt{2} - \sqrt{2}i,\ z_2 = -i$
26. $z_1 = 2 - 2i,\ z_2 = 1 + i$
27. $z_1 = -5 + 5i,\ z_2 = 3 + 3i$
28. $z_1 = i,\ z_2 = 2 + 2i$
29. $z_1 = -i,\ z_2 = 3i$
30. $z_1 = 25 - 25i,\ z_2 = 1 - i$
31. $z_1 = 1 + i,\ z_2 = -2 + 2i$
32. $z_1 = 2 - 2i,\ z_2 = i$
33. $z_1 = -1 - i,\ z_2 = 2i$
34. $z_1 = -2 - 2i,\ z_2 = 5 + 5i$
35. $z_1 = -1 - i,\ z_2 = 3i$
36. $z_1 = 4 + 4i,\ z_2 = -3i$
37. $z_1 = -2 + 2i,\ z_2 = 6i$

18. $z_1 = -2 + 2i,\ z_2 = 7i;$

19. $z_1 = i,\ z_2 = 3 - 3i;$

20. $z_1 = 1 - i,\ z_2 = 2 + 2i;$

38. $z_1 = 8 + 8i,\ z_2 = -3i$

39. $z_1 = 1 + i,\ z_2 = 5i$

40. $z_1 = -1 + i,\ z_2 = 1 - i.$

Задача 2 . Найти общее решение дифференциального уравнения и частное решение, удовлетворяющее начальному условию $y(x_0) = y_0$.

Варианты.

1. $y' \sin x - y \cos x = 1, \qquad y\left(\frac{\pi}{2}\right) = 0$
2. $y' - y \sin x = e^{-\cos x} \sin 2x, \qquad y\left(\frac{\pi}{2}\right) = 3$
3. $y' + \frac{2y}{x} = -x^2, \qquad y(3) = 1$
4. $y' + y = \frac{e^{-x}}{1 + x^2}, \qquad y(0) = 2$
5. $(1 + x^2)y - 2xy = (1 + x^2)^2, \qquad y(-2) = 5$
6. $xy' - 2y = x^3 \cos x, \qquad y(\pi) = 1$
7. $y \sin x = y' \ln y, \qquad y\left(\frac{\pi}{2}\right) = e$
8. $y' x \ln x - y = 3x^3 \ln^2 x, \qquad y(e) = 0$
9. $y' + 2xy = xe^{-x^2}, \qquad y(0) = 4$
10. $y' = \frac{1 + y^2}{1 + x^2}, \qquad y(0) = 1$
11. $y' \cos x - 2y \sin x = 2, \qquad y(0) = 3$
12. $y' - \frac{3y}{x} = x^3 e^x, \qquad y(1) = e$

13. $\sin y \cdot \cos x dy = \cos y \cdot \sin x dx, \qquad y(0) = \frac{\pi}{4}$

14. $xy' - 3y = x^4 e^x, \qquad y(1) = e$

15. $y' \cos x + y \sin x = 1, \qquad y(0) = 2$

16. $y' - xy = x^2 y, \qquad y(0) = 1$

17. $y' + \frac{y}{x} = \frac{\sin x}{x}, \qquad y\left(\frac{\pi}{2}\right) = 1$

18. $y' - \frac{y}{x} = -2 \ln x, \qquad y(1) = 1$

19. $6x dx - 6y dy = 3x^2 y dy - 2xy^2 dx, \qquad y(1) = \frac{1}{5}$

20. $xy' + 2y = \frac{1}{x}, \qquad y(3) = 1$

21. $4x dx - 3y dy = 3x^2 y dy - 2xy^2 dx, \qquad y(1) = 2$

22. $x\sqrt{1 + y^2} + yy'\sqrt{1 + x^2} = 0, \qquad y(1) = 1$

23. $y' - y \operatorname{ctg} x = 2x \sin x, \qquad y\left(\frac{\pi}{2}\right) = 0$

24. $\sqrt{3 + y^2} dx - y dy = x^2 y dy, \qquad y(1) = 1$

25. $y' + y \operatorname{tg} x = \cos^2 x, \qquad y\left(\frac{\pi}{4}\right) = \frac{1}{2}$

26. $6x dx - 6y dy = 2x^2 y dy - 3xy^2 dx, \qquad y(1) = 2$

27. $y' - \frac{y}{x+2} = x^2 + 2x, \qquad y(-1) = \frac{3}{2}$

28. $x\sqrt{3 + y^2} dx + y\sqrt{2 + x^2} dy = 0, \qquad y(1) = -1$

29. $y' - \frac{1}{x+1} y = e^x (x + 1), \qquad y(0) = 1$

30. $(e^{2x} + 5) dy + y e^{2x} dx = 0, \qquad y(0) = 3$

31. $y' - \frac{y}{x} = x \sin x\,, \qquad y\left(\frac{\pi}{2}\right) = 1$

32. $yy'\sqrt{\frac{1-x^2}{1-y^2}} + x = 0, \qquad y(0) = 0$

33. $y' + \frac{y}{x} = \sin x\,, \qquad y(\pi) = \frac{1}{\pi}$

34. $y' = 2^{x-y}, \qquad y(-3) = -5$

35. $y' + \frac{2x}{1+x^2}y = \frac{2x^2}{1+x^2}, \qquad y(0) = \frac{2}{3}$

36. $(1+e^{2x})y^2dy = e^x dx, \qquad y(0) = 0$

37. $(x^2+5)y' + x(y+1) = 0, \qquad y(2) = 0$

38. $(1+x^2)y^3dx - (y^2-1)x^3dy = 0, \qquad y(1) = -1$

39. $y' = -\frac{y}{x} + \frac{x+1}{x}e^x, \qquad y(1) = e$

40. $y' - \frac{2xy}{1+x^2} = 1 + x^2, \qquad y(1) = 3$

Задача . Найти частное решение дифференциального уравнения, удовлетворяющее начальным условиям $y(x_0) = y_0$, $y'(x_0) = y_0$

Варианты.

1. $y'' + y' - 2y = 0$, $y(0) = -1$, $y'(0) = 0$
2. $y'' + y' = 0$ $y(0) = 0$, $y'(0) = 0$
3. $y'' - 2y' = 0$, $y(0) = 0$, $y'(0) = 1$
4. $y'' + 2y' - 3y = 0$, $y(0) = 0$, $y'(0) = 1$
5. $y'' + 2y' = 0$, $y(0) = 0$, $y'(0) = 0$
6. $y'' + 2y' + y = 0$, $y(0) = 0, y'(0) = -1$
7. $y'' - 2y' + y = 0$, $y(0) = 0$, $y'(0) = 1$
8. $y'' - 2y' + 2y = 0$, $y(0) = 2$, $y'(0) = 0$
9. $y'' + y' = 0$. $y(0) = 2$, $y'(0) = 0$
10. $y'' + 2y' + y = 0$, $y(0) = 1$, $y'(0) = 0$
11. $y'' + 2y' + 5y = 0$, $y(0) = 1$, $y'(0) = 0$
12. $y'' + 2y' + 2y = 0$ $y(0) = 0$; $y'(0) = 0$

13. $y'' + y = 0$, $y(0) = -1$, $y'(0) = 0$

14. $y'' + 4y = 0$, $y(0) = 1$, $y'(0) = 0$

15. $y'' - 2y' + 5y = 0$, $y(0) = 0, y'(0) = 0$

16. $y'' + y' = 0$, $y(0) = 2$, $y'(0) = 0$

17. $y'' - y' = 0$, $y(0) = 0$, $y'(0) = 0$

18. $y'' + 2y' + y = 0$, $y(0) = 0$, $y'(0) = 0$

19. $y'' - 4y' + 5y = 0$, $y(0) = 0$, $y'(0) = 1$

20. $y'' - y = 0$, $y(0) = -1$, $y'(0) = 0$

21. $y'' + y = 0$, $y(0) = 1$, $y'(0) = -1$

22. $y'' - 2y' + y = 0$, $y(0) = 2, y'(0) = 0$

23. $y'' + 2y' + y = 0$, $y(0) = 0, y'(0) = 1$

24. $y'' + 4y = 0$, $y(0) = 1, y'(0) = 0$

25. $y'' + y = 0$, $y(0) = -1, y'(0) = 0$

26. $y'' + y' = 0$, $y(0) = 1$, $y'(0) = 0$

27. $y'' + y' = 0$, $y(0) = 0$, $y'(0) = -1$

28. $y'' - 3y' + 2y = 0$, $y(0) = 0$, $y'(0) = 0$

29. $y'' - y' = 0$, $y(0) = 0$, $y'(0) = 1$

30. $y'' + y = 0$, $y(0) = 0$, $y'(0) = 0$

31. $y'' + 4y = 0$, $y(0) = 0$, $y'(0) = 0$

33. $y'' + y = 0$, $y(0) = -1$, $y'(0) = 0$

34. $y'' + 2y' + 5y = 0$, $y(0) = 0$, $y'(0) = 0$

35. $y'' + y' = 0$, $y(0) = 0$, $y'(0) = 0$

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

37. $y'' + 9y = 0$, $y(0) = 0$, $y'(0) = 0$

38. $y'' + 4y' = 0$, $y(0) = \frac{1}{4}$, $y'(0) = 0$

39. $y'' - 5y' - 6y = 0$, $y(0) = 0, y'(0) = 1$

40. $y'' - 2y' + 5y = 0$, $y(0) = 0, y'(0) = 0$