

## Диференціальне числення

**Завдання 21.** Продиференціювати задану функцію.

$$21.1. y = 2x^3 + 4\sqrt{x^7} - \operatorname{tg} x$$

$$21.2. y = \frac{4}{x} - 3\sqrt[3]{x^2} + 3\sin x$$

$$21.3. y = 3x^2 + 8\sqrt[4]{x} - 5\operatorname{arctg} x$$

$$21.4. y = \frac{1}{4}x^4 - 2\sqrt{x} + \arcsin x$$

$$21.5. y = \frac{5}{x^3} + 6\sqrt[3]{x} - 7\log_2 x$$

$$21.6. y = \frac{2}{x^6} + 10\sqrt[5]{x} - 3e^x$$

$$21.7. y = 2x^7 + 8\sqrt[4]{x^3} - \cos x$$

$$21.8. y = \frac{8}{x} + 4\sqrt{x^3} + 2\ln x$$

$$21.9. y = \frac{1}{2x^4} - 5\sqrt{x^2} + 6\sin x$$

$$21.10. y = \frac{x^4}{2} + 6\sqrt[3]{x^2} - 3\cos x$$

$$21.11. y = \frac{2}{x^3} + 5\sqrt{x^2} - 2\arccos x$$

$$21.12. y = \frac{1}{3x} - 9\sqrt[3]{x^4} - 5 \cdot 4^x$$

$$21.13. y = \frac{2}{5}x^5 + 8\sqrt{x} - 3\operatorname{arcctg} x$$

$$21.14. y = \frac{1}{2}x^4 + 6\sqrt{x^2} - 4\log_3 x.$$

$$21.15. y = 7x^3 + 3\sqrt{x^5} - 3^x.$$

$$21.16. y = \frac{2}{5}x^3 - \frac{3}{x} + \frac{1}{x^2} + \sqrt[5]{x^2}$$

$$21.17. y = \frac{x^5}{4} - \frac{3}{x^4} - \frac{2}{x} + 5\sqrt[3]{x^2}$$

$$21.18. y = \frac{3}{x^4} - 4x^3 + \frac{5}{x} + \sqrt[5]{x^3}$$

$$21.19. y = \frac{3}{7}x^8 - \frac{1}{x} + \frac{4}{x^5} + \sqrt[4]{x^3}$$

$$21.20. y = \frac{x^7}{6} - \frac{2}{x^3} - \frac{4}{x} + 7\sqrt[3]{x^2}$$

$$21.21. y = \frac{3}{x^4} - 5x^7 + \frac{3}{x} + \sqrt[5]{x^4}$$

$$21.22. y = x^3 - \frac{2}{x} + \frac{4}{x^5} + 4\sqrt[4]{x^5}$$

$$21.23. y = \frac{x^5}{5} - \frac{4}{x^3} - \frac{2}{x} + 7\sqrt[3]{x}$$

$$21.24. y = \frac{2}{x^4} - 7x^6 + \frac{5}{x} + 8\sqrt[6]{x^5}$$

$$21.25. y = 3x^4 - \frac{2}{x^3} + \frac{1}{x} + 6\sqrt{x^3}$$

$$21.26. y = 10x^4 - \frac{5}{x^3} - \frac{8}{x} + \sqrt[3]{x}$$

$$21.27. y = \frac{8}{x^3} - 15x^6 + \frac{3}{x} + \sqrt[5]{x^7}$$

$$21.28. y = 9x^4 - \frac{6}{x} + \frac{7}{x^5} + \sqrt{x^7}$$

$$21.29. y = \frac{x^7}{7} - \frac{5}{x^3} - \frac{8}{x} + \sqrt[3]{x^5}$$

$$21.30. y = \frac{2}{x^5} - 14x^5 + \frac{5}{x} + \sqrt[5]{x^9}$$

**Завдання 22.** Продиференціювати задану функцію.

$$22.1. y = \sqrt[4]{3x^2 + 5x - 4}$$

$$22.2. y = \cos(4x^2 + 3x - 2)$$

$$22.3. y = \operatorname{ctg}(2x^2 + x - 4)$$

$$22.4. y = \ln(2x^2 - 3x + 5)$$

$$22.5. y = \sqrt{x^3 - 4x + 5}$$

$$22.6. y = \operatorname{tg}(3x^2 + x - 2)$$

$$22.7. y = \operatorname{arctg}(2x^2 - 1)$$

$$22.8. y = 3^{2x^3 - 4x + 3}$$

$$22.9. y = \sqrt[5]{(2x^2 - 4x + 5)^2}$$

$$22.10. y = \arccos(3x^2 + 5)$$

$$22.11. y = \log_3(2x^2 - 4x + 3)$$

$$22.12. y = 2e^{4x^2 + 3x - 2}$$

$$22.13. y = \sqrt[3]{(2x^2 + 5x - 3)^2}$$

$$22.14. y = \sin(2x^2 - 3x + 5)$$

$$22.15. y = \log_4(x^2 + 2x + 7)$$

$$22.16. y = \sqrt{(3x^2 - 2x + 5)^5}$$

$$22.17. y = \frac{7}{2x^2 - 5x + 7}$$

$$22.18. y = \sqrt[3]{x^2 - 3x + 2}$$

$$22.19. y = \frac{4}{(x^2 + 3x + 4)^5}$$

$$22.20. y = \operatorname{arctg}(2x^2 + 5x - 7)$$

$$22.21. y = \ln(x^2 - 5x + 4)$$

$$22.22. y = \sqrt[3]{(x^2 - 3x + 5)^4}$$

$$22.23. y = \frac{7}{(2x^2 + 3x + 1)^3}$$

$$22.24. y = \sqrt[5]{(x^2 - 7x - 4)^3}$$

$$22.25. y = e^{2x^2 - 4x + 3}$$

$$22.26. y = \sqrt[4]{(2x^2 + 5x - 4)^3}$$

$$22.27. y = \sqrt[5]{(2x^3 - 5x + 2)^6}$$

$$22.28. y = \cos(5x^2 - 6x + 7)$$

22.29.  $y = 2^{x^2-3x+2}$

22.30.  $y = \frac{5}{(4x^2 + 3x + 2)^6}$

**Завдання 23.** Продиференціювати задану функцію.

23.1.  $y = 3^x \ln(4x - 3)$

23.2.  $y = \frac{e^{5x}}{2x^2 - 3}$

23.3.  $y = x^4 \cos(2x^2 - 5)$

23.4.  $y = \frac{\operatorname{ctg} x}{\ln(2x + 3)}$

23.5.  $y = e^{-2x^2} \operatorname{arctg} x$

23.6.  $y = \frac{\sin(3x + 2)}{\ln x}$

23.7.  $y = \cos x \cdot \ln(2x - 3)$

23.8.  $y = \frac{\operatorname{tg} x}{\ln(2x - 1)}$

23.9.  $y = \frac{e^{\cos x}}{3x^2 - 4}$

23.10.  $y = \frac{\ln x}{\sin(4x + 3)}$

23.11.  $y = 3^{\sin x} (4x - 3)$

23.12.  $y = \frac{7^{5x}}{2x^2 - 3}$

23.13.  $y = \frac{4^{-x}}{2x^2 - 5}$

23.14.  $y = \frac{\operatorname{arctg} x}{\ln(2x + 3)}$

23.15.  $y = \frac{\operatorname{arctg} 6x}{7x^3 - 3x + 2}$

23.16.  $y = \frac{\cos 2x}{(4x + 3)^2}$

23.17.  $y = 2^{\sin x} \cdot \arcsin x$

23.18.  $y = \frac{e^{2x}}{7x - 2}$

23.19.  $y = e^{2x} \cdot \cos(3x - 5)$

23.20.  $y = \frac{\operatorname{ctg} x}{\ln(2x + 3)}$

23.21.  $y = \frac{\cos^2 x}{3x - 4}$

23.22.  $y = 2^{\sin x} \cdot \ln 3x$

23.23.  $y = 2^x \cdot \ln(2x - 5)$

23.24.  $y = \frac{\operatorname{tg} x}{\ln(4x + 3)}$

23.25.  $y = \operatorname{ctg} x \cdot \ln 2x$

23.26.  $y = \frac{\cos 2x}{2x^3 + 3}$

23.27.  $y = \frac{e^{-3x}}{\ln(5x + 3)}$

23.28.  $y = \ln x \cdot \cos(2x - 5)$

23.29.  $y = e^{4x} \cdot \ln(3x - 2)$

23.30.  $y = \frac{e^{5x}}{(x - 4)^4}$

**Завдання 26.** Знайти похідну вказаного порядку.

26.1.  $y = x \cos x^2, \quad y'' - ?$

26.2.  $y = (5x - 1) \ln^2 x, \quad y'' - ?$

26.3.  $y = (4x^3 + 5) e^{2x+1}, \quad y'' - ?$

26.4.  $y = (x^2 + 3) \ln(x - 3), \quad y'' - ?$

$$26.5. y = \frac{\sin 2x}{x}, \quad y'' - ?$$

$$26.6. y = (4x+3)2^{-x}, \quad y'' - ?$$

$$26.7. y = x \ln(1-3x), \quad y'' - ?$$

$$26.8. y = \frac{\log_3 x}{x^2}, \quad y'' - ?$$

$$26.9. y = \frac{\ln(x-2)}{x-2}, \quad y'' - ?$$

$$26.10. y = \frac{\ln x}{x^5}, \quad y'' - ?$$

$$26.11. y = x^2 \cos x, \quad y'' - ?$$

$$26.12. y = (5x^3 - 1) \ln x, \quad y'' - ?$$

$$26.13. y = (2x^2 - 3)e^{2x}, \quad y'' - ?$$

$$26.14. y = (x^2 + 3) \sin x, \quad y'' - ?$$

$$26.15. y = \frac{\cos 3x}{x}, \quad y'' - ?$$

$$26.16. y = x^3 \sin x, \quad y'' - ?$$

$$26.17. y = (3x^2 - 4) \ln x, \quad y'' - ?$$

$$26.18. y = x^3 e^{2x+1}, \quad y'' - ?$$

$$26.19. y = (x^2 + 3) \cos x, \quad y'' - ?$$

$$26.20. y = \frac{\sin x}{x^2}, \quad y'' - ?$$

$$26.21. y = 5x 2^{3x-1}, \quad y'' - ?$$

$$26.22. y = x^4 \ln x, \quad y'' - ?$$

$$26.23. y = \frac{\ln x}{x^5}, \quad y'' - ?$$

$$26.24. y = \frac{\cos(x-2)}{x-2}, \quad y'' - ?$$

$$26.25. y = \frac{\ln x}{x^5}, \quad y'' - ?$$

$$26.26. y = x^2 \ln x, \quad y'' - ?$$

$$26.27. y = (5x^3 - 1)e^x, \quad y'' - ?$$

$$26.28. y = 4x^3 e^{2x}, \quad y'' - ?$$

$$26.29. y = x^2 \sin x, \quad y'' - ?$$

$$26.30. y = \frac{\operatorname{tg} x}{x}, \quad y'' - ?$$