

Задание 1. Найти производную (аналитически и численно).

$$1. y = \frac{2(3x^3 + 4x^2 - x - 2)}{15\sqrt{1+x}}.$$

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

$$3. y = \frac{x^4 - 8x^2}{2(x^2 - 4)}.$$

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

$$5. y = \frac{(1+x^8)\sqrt{1+x^8}}{12x^{12}}.$$

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

$$7. y = \frac{(x^2 - 6)\sqrt{(4+x^2)^3}}{120x^5}.$$

$$8. y = \frac{(x^2 - 8)\sqrt{x^2 - 8}}{6x^3}.$$

$$9. y = \frac{4+3x^3}{x^3\sqrt{(2+x^3)^2}}.$$

$$10. y = \sqrt[3]{\frac{(1+x^{3/4})^2}{x^{3/2}}}.$$

$$11. y = \frac{x^6 + x^3 - 2}{\sqrt{1-x^3}}.$$

$$12. y = \frac{(x^2 - 2)\sqrt{4+x^2}}{24x^3}.$$

$$13. y = \frac{1+x^2}{2\sqrt{1+2x^2}}.$$

$$14. y = \frac{\sqrt{x-1}(3x+2)}{4x^2}.$$

$$15. y = \frac{\sqrt{(1+x^2)^3}}{3x^3}.$$

$$16. y = \frac{x^6 + 8x^3 - 128}{\sqrt{8-x^3}}.$$

$$17. y = \frac{\sqrt{2x+3}(x-2)}{x^2}.$$

$$18. y = (1-x^2)^5 \sqrt[5]{x^3 + \frac{1}{x}}.$$

$$19. y = \frac{(2x^2+3)\sqrt{x^2-3}}{9x^3}.$$

$$20. y = \frac{x-1}{(x^2+5)\sqrt{x^2+5}}.$$

$$21. y = \frac{(2x+1)\sqrt{x^2-x}}{x^2}.$$

$$22. y = 2\sqrt{\frac{1-\sqrt{x}}{1+\sqrt{x}}}.$$

$$23. y = \frac{1}{(x+2)\sqrt{x^2+4x+5}}.$$

$$24. y = 3\frac{\sqrt[3]{x^2+x+1}}{x+1}.$$

$$25. y = 3 \cdot \sqrt[3]{\frac{(x+1)}{(x-1)^2}}.$$

$$26. y = \frac{x+7}{6\sqrt{x^2+2x+7}}.$$

$$28. y = \frac{x^2+2}{2\sqrt{1-x^4}}.$$

$$29. y = \frac{(x+3)\sqrt{2x-1}}{2x+7}.$$

$$30. y = \frac{3x+\sqrt{x}}{\sqrt{x^2+2}}.$$

Задание 2. Решить нелинейное уравнение методом Ньютона

1. $x^4 + 2.83x^3 - 4.5x^2 - 64x - 20 = 0$

2. $x^3 + \sin x - 12x - 1 = 0$

3. $x^3 - 3x^2 - 14x - 8 = 0$

4. $3x + \cos x + 1 = 0$

5. $x^2 + 4 \sin x - 1 = 0$

6. $4x - \ln x = 5$

7. $x^6 - 3x^2 + x - 1 = 0$

8. $x^3 - 0.1x^2 + 0.3x - 0.6 = 0$

9. $x^6 + 101x^5 + 425x^4 - 425x^2 - 101x - 1 = 0$

10. $(x-1)^3 + 0.5e^x = 0$

11. $\sqrt{x+1} - 1/x = 0$

12. $x^5 - 3x^2 + 1 = 0$

13. $x^3 - 4x^2 - 10x - 10 = 0$