Задача 5. Найти производную.

5.1.

(9x2+8x-1)(x+1)1/2 – (3x3+4x2-x-2)

y'=2/15\* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_2(1+x)1/2 =

1+x

= 2/15\* (2x+2)(9x2+8x-1)-3x3-4x2+x+2 =

2(x+1)3/2

=2/15\* 18x3+16x2-2x+18x2+16x-2-3x3-4x2+x+2 =

2(x+1)3/2

= 2/15\* 15x3+30x2+15x =

2(x+1)3/2

= x(x+1)2 = x(x+1)1/2

(x+1)3/2

5.2. 

3x3\*4x(x2+1)1/2+x(2x2-1) -9x2(2x2-1)(x2+1)1/2

y'= (x2+1)1/2 =

9x6

= 12x4(x2+1)+3x4(2x2-1)-9x2(2x2-1)(1+x2) =

9x6(x2+1)1/2

= 12x4+12x6+6x6-3x4-18x4-18x6+9x2+9x4 =

9x6(x2+1)1/2

= 9x2 = 1 .

9x6(x2+1)1/2 x4(x2+1)1/2

5.3. 

y'= (4x3-16x)(x2-4)-(x4-8x2)2x = 4x5-16x3-16x3+64x-2x5+16x3 =

2(x2-4)2 2(x2-4)2

=2x5-16x3+64x =x(x2-4)2+16x = x+ 16x2 .

2(x2-4)2 (x2-4)2 (x2-4)2

5.4. 

(4x-1)√(2+4x) – 2(2x2-x-1)

y'= √(2+4x) = (4x-1)(2+4x)-4x2+x+1 =

3(2+4x) 3(2+4x)√(2+4x)

= 12x2+5x-1 .

3(2+4x)√(2+4x)

5. 5. 

8x19√(1+x8)+ 4x19(1+x8) – 12x11(1+x8)3/2

y'= √(1+x8) =

12x24

= 12x19(1+x8)-12x11(1+x8)2 =

12x24√(1+x8)

= x11(x16-2x8+1) = (x8-1)2 .

x24√(1+x8) x13√(1+x8)

5.6. 

2x√(1-3x4) + 6x5 ­

y'= √(1-3x4) = 2x(1-3x4)+6x5 = x .

2(1-3x4) 2(1-3x4)√(1-3x4) √(1-3x4)3

5.7. 

y= (2x(4+x2)√(4+x2)+3/2√(4+x2)\*2x)x5-(x2-6)(4+x2)√(4+x2)\*5x4  =

120x10

= √(4+x2)(8x6+2x8+3x6-20x6-5x8+30x6+120x4) =

120x10

= √(4+x2)(7x2-x4+40)

40x6

5.8. 

y= 3/2√(x2-8)\*2x4-(x2-8)√(x2-8)\*18x2 =

6x6

√(x2-8)(x4-6x4+48x2) = √(x2-8)(48-5x2)

3x6 3x4

5.9. 

9x3(2+x3)2/3-(4+3x3)((2+x3)2/3+2/3\* 3x3 )

y'= (2+x3)1/3 =

x2(2+x3)4/3

= 9x3(2+x3)-(4+3x3)(2+3x3) = 8 .

x2(2+x3)5/3 x2(2+x3)5/3

5.10. 

y'= √(x)\*(2(1+x3/4)\*3/4x5/4-(1+x3/4)2\*3/2\*√(x)) =

3(1+x3/4)2/3\*x6/4

= √(x)(x3/2-1)

2x(1+x3/2)2/3

5.11. 

(6x5+3x2)√(1-x3) + 3x2(x6+x3-2)

y' = 2√(1-x3) =

1-x3

=(2-2x3)(6x5+3x2)+3x8+3x5-6x2 = (9x5-9x8) = 9x5 .

2(1-x3)3/2 2(1-x3)3/2 2√(1-x3)

5.12. 

2x4√(4+x2)+ x4(x2-2) -3x2(x2-2)√(4+x2)

y'= √(4+x2) =

24x6

= 2x4(4+x2)+x4(x2-2)-3x2(x2-2)(4+x2) = 1

24x6 x4

5.13. 

2x√(1+2x2)- 2x(1+x2)

y'= √(1+2x2) = x(1+2x2)-x(1+x2) = x3 .

2(1+2x2) (1+2x2)3/2 (1+2x2)3/2

5.14. 

y'= ((3x+2)/(2√(x-1))+3√(x-1))x2-2x√(3x+2) =

4x4

= x2(3x+2)+6x2(x-1)-4x(x-1)(3x+2) = 9x3-12x2+8x = 9x2-12x+8

4x2√(x-1) 4x2√(x-1) 4x√(x-1)

5.15. 

y'= 3/2\*√(1+x2)\*2x4-3x2(1+x2)3/2 = √(1+x2)\*(x4-x2-x4) = -√(1+x2)

3x6 x6 x4

5.16. 

(6x5+24x2)√(8-x3)+3x2(x6+8x3-128)

y'= 2√(8-x3) =

8-x3

= (16-2x3)(6x5+24x2)+3x2(x6+8x3-128) = 72x5-9x8 = 9x5

2(8-x3)3/2 2(8-x3)3/2 2√(8-x3)

5.17. 

x2(x-2)+x2√(2x+3)-(2x2-4x)√(2x+3)

y'= √(2x+3) =

x4

= x2(x-2+2x+3)-(2x2-4x)(2x+3) = 3x2-x3+12x = 3x-x2+12

x4√(2x+3) x4√(2x+3) x3√(2x+3)

5.18. 

y'=-2x5√(x3+1/x)+(1-x2)\*1/5\*(x3+1/x)4/5\*(3x2-1/x2)=1/5\*(x3+1/x)4/5(3x2-1/x2-3x4+1)-2x(x3+1/x)1/5

5.19. 

4x4√(x2-3)+x4(2x2+3) - 3x2(2x2+3)√(x2-3)

y' = √(x2-3) =

9x6

= 4x4(x2-3)+x4(2x2+3)-3x2(2x2+3)(x2-3) = 27x2 = 3 .

9x6√(x2-3) 9x6√(x2-3) x4√(x2-3)

5.20. 

y'= (x2+5)3/2-3/2\*(x-1)√(x2+5)\*2x = √(x2+5)(5+3x-2x2)

(x2+5)3 (x2+5)3

5.21. 

2x2√(x2-x)+(2x-1)(2x+1)x2-2x(2x+1)√(x2-x)

y'= √(x2-x) =

x4

= x2(2x2-2x+4x2-1)-(4x2+2x)(x2-x) = 2x2+1

x4 x2

5.22. 

\_ 1+√x \_ 1-√x

y' = √((1+√x)/(1-√x))\* 2√x 2√x =

(1+√x)2

= -2√((1+√x)/(1-√x)) = -1 .

2√x(1+√x)2 √(x(1-x))(1+√x)

5.23. 

√(x2+4x+5) - x(x+2)

y' = √(x2+4x+5) = - 2x2-6x-5 .

(x+2)2(x2+4x+5) (x+2)2(x2+4x+5)3/2

5.24. 

2x+1 -3(x2+x+1)1/3

y' = (x2+x+1)2/3 = -3x2-x-2 .

(x+1)2 (x+1)2(x2+x+1)2/3

5.25. 

y'= 3√((x-1)4/(x+1)2)\*(x-1)2-2(x-1)(x+1) = -3√((x-1)4/(x+1)2)\*x2+2x-3 =

(x-1)4 (x-1)4

= 3-x2-2x

(x2-1)2/3(x-1)2

5.26. 

√(x2+2x+7)-(x+1)(x-1)

y' = √(x2+2x+7) = x2+2x+7-x2-8x-7 = -x .

6(x2+2x+7) 6(x2+2x+7)3/2 (x2+2x+7)3/2

5.27. 

y' = (x2+x+1)(√(x+1)+x/(2√(x+1)))-(2x2+x)√(x+1) =

(x2+x+1)2

= (3x+2)(x2+x+1)-(4x2+2x)(x+1) = -x3-x2+3x+2

2(x2+x+1)√(x+1) 2(x2+x+1)√(x+1)

5.28. 

y' = 2x√(1-x4)+2x(x2+2)/√(1-x4) = 3x-x5+x3

2-2x4 (1-x4)3/2

5.29. 

y' = (√(2x-1)+(x+3)/√(2x-1))(2x+7)-(2x+6)√(2x-1) =

(2x+7)2

= (3x+2)(2x+7)-(2x+6)(2x-1) = 2x2+15x+20

(2x+7)2√(2x-1) (2x+7)2√(2x-1)

5.30. 

y' = (3+1/(2√x))√(x2+2)-(3x+√x)x/√(x2+2) =

x2+2

= (6√x+1)(x2+2)-2x√x(3x+√x) = 12√x+2-x2

2√x(x2+2)3/2 2√x(x2+2)3/2

5.31. 

y' = (18x5+16x3-2x)√(1+x2)-x(3x6+4x4-x2-3)/√(1+x2) = 16x7+14x5+16x4+15x3

15+15x2 15(1+x2)3/2