Часть 2.

7.2.4 $dy$-? $y = x^2 \ln x$

$y'_x = (x^2 \ln x)'_x = 2x \ln x + x^2 \frac{1}{x} = 2x \ln x + x = x(2\ln x + 1)$

$\Rightarrow dy = y' dx = (x(2\ln x + 1))dx$

7.2.5. $dy$-? $y = \frac{x-2}{x^2+1}$

$y'_x = \left(\frac{x-2}{(x^2+1)^2}\right)'_x = \frac{1(x^2+1) - 2x\cdot(x-2)}{(x^2+1)^2} = \frac{-x^2+4x+1}{(x^2+1)^2}$

$\Rightarrow dy = y' dx = \left(\frac{-x^2+4x+1}{(x^2+1)^2}\right) dx$

7.2.8. $\Delta y, dy$-?, $y = x^2 + x - 5$, $x_0 = 0$, $\Delta x = 0{,}5$

$\Delta y = y(x+\Delta x) - y(x) = (x+\Delta x)^2 + (x+\Delta x) - 5 - x^2 - x + 5 =$

$= x^2 + 2x\Delta x + (\Delta x)^2 + x + \Delta - x^2 - x = \Delta x(2x+1) + (\Delta x)^2$

$\Delta y\Big|_{\substack{x_0=0 \\ \Delta x = 0{,}5}} = 0{,}5(2\cdot 0 + 1) + (0{,}5)^2 = 0{,}75$

$dy\Big|_{\substack{x_0=0 \\ \Delta x = 0{,}5}} = 0{,}5(2\cdot 0 + 1) = 0{,}5$

7.2.10. $\sqrt[3]{26}$

$x = 26 = 27 + (-1) \Rightarrow x_0 = 27, \Delta x = -1$

$\Rightarrow \sqrt[3]{26} \approx \sqrt[3]{27} + \frac{1}{3\sqrt[3]{27^2}} \cdot (-1) = 3 + \frac{1}{3\cdot 9}\cdot(-1) = 2{,}96$

7.2.12. $(1{,}02)^5$

$F(x_0 + \Delta x) \approx F(x_0) + F'(x_0)\Delta x$

$(x_0 + \Delta x)^5 = (x_0)^5 + (x^5)'_{x_0}\Big|_{x_0} \Delta x$

$x = 1{,}02 = 1 + 0{,}02 \Rightarrow x_0 = 1, \Delta x = 0{,}02.$

$(1{,}02)^5 = 1^5 + 5\cdot 1^4 \cdot 0{,}02 = 1 + 0{,}1 = 1{,}1.$

7.2.14. $y = (x^2+1)^3$

1) $dy = f'(x)dx = ((x^2+1)^3)'_x dx = 3(x^2+1)^2(x^2+1)'dx =$

$= 6x(x^2+1)^2 dx$

2) $d^2y = d(dy) = d(6x(x^2+1)^2 dx) = (6x(x^4+2x^2+1))'dx^2 =$

$= (6x^5+12x^3+6x)'dx^2 = (30x^4+36x^2+6)dx^2$

$= 6(5x^4+6x^2+1)dx^2$

7.2.15. $y = \sin^2 x$

1) $dy = f'(x)dx = (\sin^2 x)'_x dx = 2\sin x \cos x\, dx =$

$= \sin 2x\, dx$

2) $d^2y = d(dy) = d(\sin 2x\, dx) = (\sin 2x)'dx^2 =$

$= 2\cos 2x\, dx^2.$