Практическая работа часть 2

7.2.4 dy-?

$y = x^2 \cdot \ln x$

□

$$dy = y'dx = (x^2 \cdot \ln x)'_x dx = ((x^2)'_x \cdot \ln x + x^2 \cdot (\ln x)'_x)dx =$$

$$= (2x \cdot \ln x + x^2 \cdot \frac{1}{x})dx = (2x\ln x + x)dx =$$

$$= \underline{x(2\ln x + 1)dx}$$

■

7.2.5 dy-?

$$y = \frac{x-2}{x^2+1}$$

□

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

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

$$= \underline{\left(\frac{-x^2+4x+1}{(x^2+1)^2}\right)dx}$$

■

7.2.8 $\Delta y, dy - ?$

$y = x^2 + x - 5, \quad x_0 = 0, \quad \Delta x = 0{,}5$

□

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

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

$= 2x\cdot\Delta x + (\Delta x)^2 + \Delta x = (\Delta x)^2 + \underbrace{(2x+1)\Delta x}_{dy}$

$\Delta y\Big|_{\substack{x_0=0\\ \Delta x=0{,}5}} = (0{,}5)^2 + (2\cdot 0 + 1)\cdot 0{,}5 = 0{,}25 + 1\cdot 0{,}5 = \underline{0{,}75}$

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

7.2.10

$\sqrt[3]{26}$

□

$\sqrt[3]{x_0+\Delta x} \approx \sqrt[3]{x_0} + \underbrace{\left(\sqrt[3]{x}\right)'_x}_{\frac{1}{3}\cdot\frac{1}{\sqrt[3]{x^2}}}\Big|_{x_0}\cdot\Delta x$

$x = 26 = 27 - 1 = 3^3 - 1$

$\Rightarrow x_0 = 27, \quad \Delta x = -1$

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

7.2.11

$tg(44^\circ)$

□

$tg(x_0+\Delta x) \approx tg(x_0) + \underbrace{(tg(x))'_x}_{\frac{1}{\cos^2 x}}\Big|_{x_0} \cdot \Delta x$

$x = 44 = 45 - 1$

$\Rightarrow x_0 = 45, \Delta x = -1$

$tg(44^\circ) \approx tg(45^\circ) + \frac{1}{\cos^2 45^\circ} \cdot (-1^\circ) = 1 + \frac{1}{\left(\frac{\sqrt{2}}{2}\right)^2} \cdot \left(-\frac{\pi}{180^\circ}\right) =$

$= 1 - \frac{1}{\frac{1}{2}} \cdot (0{,}0175) = 1 - 2 \cdot (0{,}0175) =$

$= 1 - 0{,}035 = \underline{0{,}965}$

7.2.12

$(1{,}02)^5$

□

$(x)^5 \approx (x_0)^5 + \underbrace{(x^5)'_x}_{5x^4}\Big|_{x_0} \cdot \Delta x$

$x = 1{,}02 = 1 + 0{,}02$

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

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

7.2.14 dy, d^2y

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

□

$dy = y'_x dx = ((x^2+1)^3)'_x dx = (3(x^2+1)^2 \cdot 2x)dx =$

$= \underline{6x(x^2+1)^2 dx}$

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

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

$= (6 \cdot ((x^2+1)^2 + 4x^2(x^2+1)))(dx)^2 = \underline{6 \cdot (5x^2+1)(x^2+1)dx^2}$

■

7.2.15 dy, d^2y

$y = \sin^2 x$

□

$dy = y'_x dx = (\sin^2 x)'_x dx = 2\sin x \cdot \cos x \, dx =$

$= \underline{\sin 2x \, dx}$

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

$= \cos 2x \cdot 2 \cdot (dx)^2 = \underline{2\cos 2x \, dx^2}$

■