1) $\Delta y = A \cdot \Delta x + \boxed{d(\Delta x) \cdot \Delta x}$ — бескон. малое

где $\lim\limits_{\Delta x \to 0} d(\Delta x) = 0$

2) dy — дифференциал

$df(x_0)$ — дифференциал в (·) x_0

3) $dx = \Delta x$

4) $dy = f'(x)dx \qquad x \in (a; b)$

$f'(x) = \dfrac{dy}{dx}$

5) $f(x_0 + \Delta x) \approx f(x_0) + \underbrace{f'(x_0) \cdot \Delta x}_{df(x_0)}$

$\approx 7.2.1.$

$y = e^{x^3} \qquad dy = ?$

$dy = y'_x \, dx = \left(e^{x^3}\right)'_x dx = \left[\left(e^{\square}\right)' \cdot \square'_x \right] =$

$= e^{x^3} \cdot (x^3)'_x \, dx = e^{x^3} \cdot 3x^2 \, dx =$

$3 \cdot x^2 e^{x^3} dx$

$\frac{...}{y} = (\sin \pi x)' \cdot \ln x + \sin x \cdot (\ln x)'$

$= (2 \cdot 2 - 3) \cdot 0,1 = 0,1$

№7.6

$y = x^2 - 3x + 1 \qquad \Delta y, \, dy - ? \quad \theta(\cdot) \, x_0 = 2$

$\Delta x = 0,1$

1сп

$\Delta y = y(x + \Delta x) - y(x) = ((x + \Delta x)^2 - 3(x + \Delta x)$
$-(x^2 - 3x + 1) = x^2 + 2x \Delta x + (\Delta x)^2 - 3x - 3\Delta x$
$+1 - x^2 + 3x - 1 = (2x \Delta x - 3 \Delta x) + (\Delta x)^2 =$
$= \underline{(2x - 3) \Delta x} + (\Delta x)^2 \xrightarrow{\text{б.м.в.н.}} dy = (2x-3) dx$
$\quad dy$

№7.29 найти к

1) $\ln 1,02$

$f(x_0 + \Delta x) \approx f(x_0) + f'(x_0) \cdot \Delta x$

$\qquad$ б.м по отнош x, x_0

$\ln \underline{1,02} = \ln(1 + 0,02) = [x_0 = 1 ; \Delta x = 0,02] \approx$
$\quad x_0 + \Delta x \qquad \uparrow$
$\qquad\qquad$ можем
$\qquad\qquad$ писать $\ln 1 = f(x_0)$

2сп

$dy = f'(x) dx = ((x^2 - 3x) + 1)' \cdot dx =$
$= (2x - 3) dx$

$\approx \ln(1) + (\ln(1))' \cdot 0,02 = [(\ln x)' = \frac{1}{x} = \frac{1}{1} = \ln w \frac{1}{1}] \cdot$
$\cdot 0,02 \approx 0 + 1 \cdot 0,02 = 0,02$

$\ln 1,02 \approx 0,02$

$\Delta y \Big|_{\substack{x_0 = 2 \\ \Delta x = 0,1}} = ((2x-3) \Delta x + (\Delta x)^2) =$

$= (2 \cdot 2 - 3) \cdot 0,1 + (0,1)^2 = 0,1 + 0,01 = 0,11$

2) $\sqrt{24} = \begin{bmatrix} 24 = x + 1 \\ 24 = 25 - 1 \end{bmatrix}$ подходит, т.к.

$x_0 = 25 ; \quad \Delta x = -1 ; -б.м.$ по отнош. $\frac{1}{x_0} = \frac{1}{25}$

$\sqrt{24} \cdot \frac{1}{2\sqrt{25}} \cdot (-1) = 5 + \frac{1}{2 \cdot 5} \cdot (-1) = 5 - \frac{1}{10} =$

$dy \Big| = ((2x-3) \cdot dx) = (2x-3) \cdot \Delta x) =$

$= 4 \frac{9}{10} = 4,9 \qquad$ т.е. $\sqrt{24} \approx 4,9$

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$$y = \sqrt[3]{x} \quad ; \quad dy, \, d^2y, \, d^3y - ?$$

$$dy = y'_x \, dx = (\sqrt[3]{x})'_x \, dx = (x^{\frac{1}{3}})' dx =$$

$$= \frac{1}{3} \cdot x^{\frac{1}{3}-1} dx = \frac{1}{3} \cdot x^{-2/3} dx = \frac{dx}{3 \cdot \sqrt[3]{x^2}}$$

$$d^2y = \left(\frac{1}{3\sqrt[3]{x^2}}\right)' d(dx) =$$

$$= -\frac{2}{9} \cdot x^{-5/3} \cdot dx^2 = - \frac{2dx^2}{3\sqrt[3]{x^5}} = \frac{-2 \, dx^2}{9x \sqrt[3]{x^2}}$$

$$d^3y = d(d^2y) = -\frac{2}{9} \cdot (x^{-5/3})' dx^3 =$$

$$= \frac{10 \, dx^3}{27 \cdot x^2 \sqrt[3]{x^2}}$$