Интегралы и дифференциальные уравнения

Отчёт по лекции 26.10

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№11.3.18 | 26.10

$1{,}07^{3{,}97}$

$f(x;y)=x^y$

$x=1{,}07$

$y=3{,}97$

$x_0=1$ $\quad \Delta x=0{,}07$

$y_0=4$ $\quad \Delta y=\cancel{0{,}97}\ -0{,}03$

$y_0=3$
$\Delta y=0{,}97$

$|-0{,}03|<|0{,}97|$
лучше

$f(x_0;y_0)=f(1;4)=1^4=1$

$f(x;y)=f(x_0+\Delta x;\ y_0+\Delta y)\approx f(x_0;y_0)+f'_x(x_0;y_0)\Delta x+f'_y(x_0;y_0)\Delta y$

1) $f(x_0;y_0)=f(1;4)=1^4=1$

2) $f'_x(x_0;y_0)=(x^y)'_x\Big|_{(x_0;y_0)}=(y\cdot x^{y-1})=4\cdot 1^3=4$

3) $f'_y(x_0;y_0)=(x^y)'_y=x^y\cdot\ln x=1^4\cdot\ln 1=0\cdot 1=0$

$$4)\ f(x;y) \approx \cancel{f(x_0;y_0)} \approx f(x_0;y_0) + 4\cdot \overset{0{,}07}{\Delta x} + $$

$$+ 0\cdot \overset{-0{,}03}{\Delta y} = 1 + 0{,}28 = 1{,}28$$

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$1{,}04^{2{,}03}$

$x_0 = 1 \qquad \Delta x = 0{,}04$

$y_0 = 2 \qquad \Delta y = 0{,}03$

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$$\sqrt{(1{,}04)^2 + (3{,}01)^2} \approx$$

$$f(x;y) = \sqrt{x^2 + y^2}$$

$x = 1{,}01 \qquad \Delta x = 0{,}01 \qquad x_0 = 1$

$y = 3{,}01 \qquad \Delta y = 0{,}01 \qquad y_0 = 3$

$$f(x_0;y_0) = \sqrt{1^2 + 3^2} = \sqrt{10} \approx$$

$$f(x) = \sqrt{x} \quad \bar{x} = 10 \quad \bar{x}_0 = 9 \quad \Delta\bar{x} = 1$$

$$f(\bar{x}) = f(\bar{x}_0) + f'(\bar{x}_0)\cdot \Delta\bar{x} = \sqrt{9} + \frac{1}{2\sqrt{9}}\cdot 1 = 3 + \frac{1}{6} = \frac{19}{6} \approx$$

$$\approx 3,1(6) \approx 3,2$$

№11.3.21

$$\sin 28^\circ \cdot \cos 61^\circ \approx$$

$$f(x;y) = \sin(x)\cdot\cos(y)$$

$x = 28^0$ $\qquad x_0 = 30$ $\qquad \Delta x = 2$

$y = 61^0$ $\qquad y_0 = 60$ $\qquad \Delta y = 1$

№11.3.22

$$\sqrt{(\sin^2 1{,}55 + 8\cdot e^{0{,}015})^5}$$

$$f(x;y) = \sqrt{(\sin^2 x + 8\cdot e^y)^5} = (\sin^2 x + 8e^y)^{5/2}$$

$$f'_x = 5/2\cdot((\sin^2 x + 8e^y)^{5/2-1})\cdot(2\sin x\cdot(\sin x)'_x + 0) =$$

$$= \frac{5}{2}\cdot 2\sin x\cos x\cdot(\sin^2 x + 8e^y)^{3/2} = \frac{5}{2}\sin(2x)\cdot$$

$$\cdot(\sin^2 x + 8e^y)^{3/2}$$

$$f'_y = \cancel{((\sin^2 x + 8e^y)^5} \; 5/2\cdot((\sin^2 x + 8e^y)^{5/2-1})\cdot$$

$\cdot(0+8\cdot e^y) = \frac{5}{2}\cdot 8e^y\cdot(\sin^2x+8e^y)^{3/2} =$

$= 20e^y\cdot(\sin^2x+8e^y)^{3/2}$

$\pi = 3{,}14$ $\quad x = 1{,}55 \quad x_0 = \pi/2 \quad \Delta x = 0{,}021$

$y = 0{,}15 \quad y_0 = 0 \quad \Delta y = 0{,}015$

4) $f(x_0;y_0) = (1^2+8\cdot 1)^{5/2} = 9^{5/2} = 3^5 = 243$

5) $f'_x = \left(\frac{5}{2}\sin 2x\cdot(\sin^2x+8e^y)^{3/2}\right)\Big|_{(\frac{\pi}{2};0)} =$
$= \frac{5}{2}\cdot 0\cdot 9^{3/2} = 0$

6) $f'_y = \left(20e^y(\sin^2x+8e^y)^{3/2}\right) = 20\cdot 9^{3/2} = 540$

$f(1{,}55;0{,}015) \approx 243 + 0\cdot 0{,}021 + 540\cdot 0{,}015 =$
$= 243 + 540\cdot 0{,}015 = 251{,}1$

$\sqrt{(\sin^2 1{,}55 + 8e^{0{,}015})^5} \approx 251{,}1$

$$f(x;y;z) \approx f(x_0;y_0;z_0) + \left[f'_x(x_0;y_0;z_0)\cdot\Delta x + f'_y(x_0;y_0;z_0)\Delta y + f'_z(x_0;y_0;z_0)\Delta z \right] = df$$

$\pi; \pm\frac{\pi}{2}; \pm\frac{\pi}{4}; \pm\frac{\pi}{6} \ldots$

arc: 1; 0

Д/З

① Отчёт

② Для себя - тренировка № 11.3.19

11.3.20

11.3.21

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Сверится в конце

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