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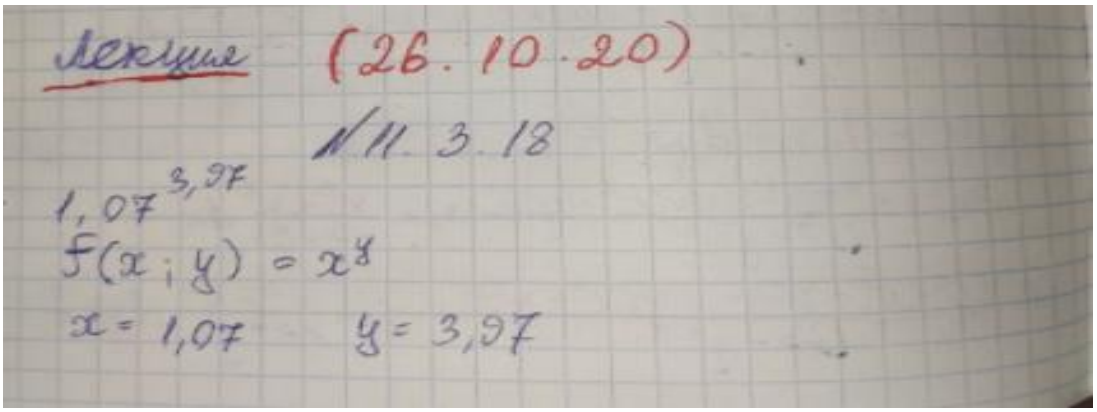
1 подгруппа



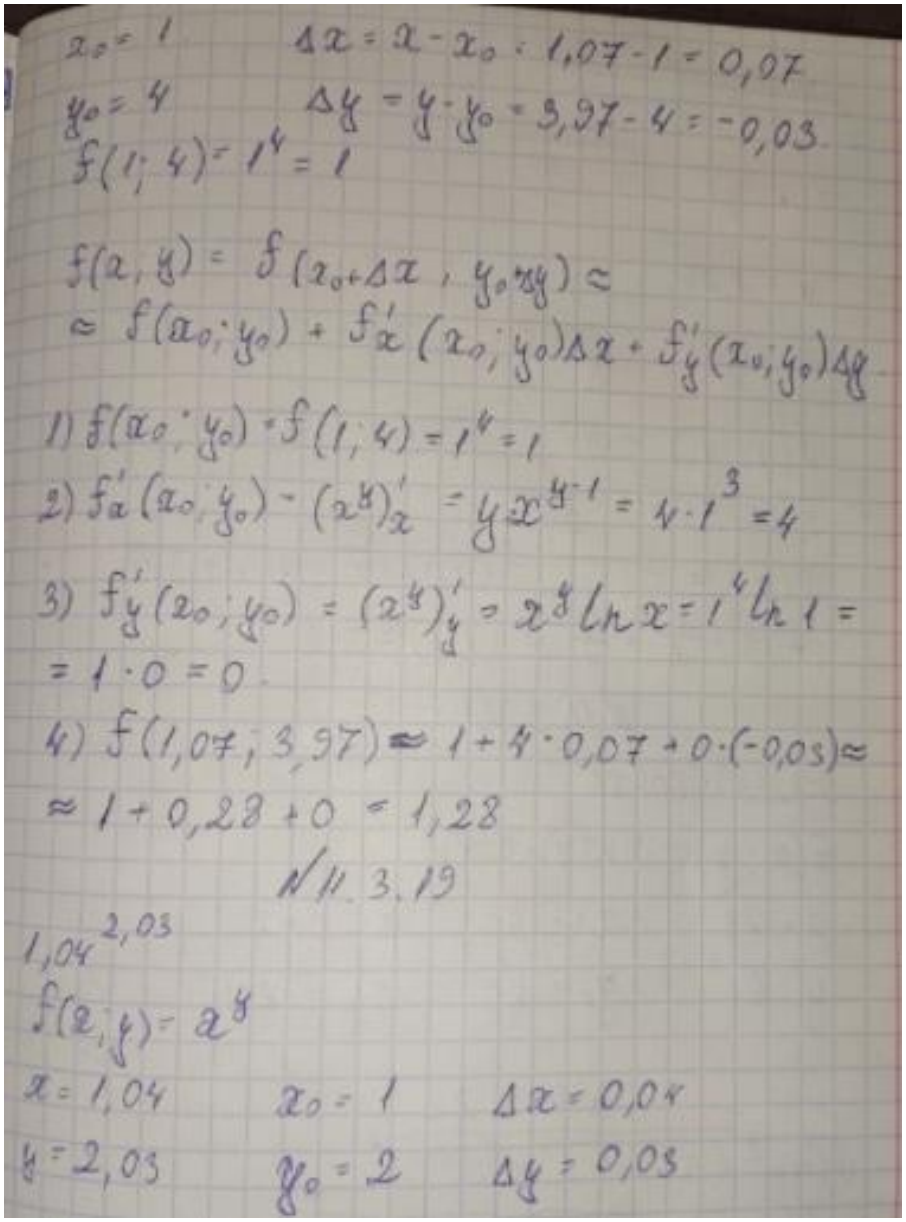
Лекция (26.10.20)

№11.3.18

$1,07^{3,97}$

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

$x = 1,07 \quad y = 3,97$



$x_0 = 1 \quad \Delta x = x - x_0 = 1,07 - 1 = 0,07$

$y_0 = 4 \quad \Delta y = y - y_0 = 3,97 - 4 = -0,03$

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

$f(x,y) = f(x_0 + \Delta x; y_0 + \Delta y) \approx$

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

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

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

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

$= 1 \cdot 0 = 0$

4) $f(1,07; 3,97) \approx 1 + 4 \cdot 0,07 + 0 \cdot (-0,03) \approx$

$\approx 1 + 0,28 + 0 = 1,28$

№11.3.19

$1,04^{2,03}$

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

$x = 1,04 \quad x_0 = 1 \quad \Delta x = 0,04$

$y = 2,03 \quad y_0 = 2 \quad \Delta y = 0,03$

№ 11.3.20

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

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

$x = 1,04 \quad x_0 = 1 \quad \Delta x = 0,04$

$y = 3,01 \quad y_0 = 3 \quad \Delta y = 0,01$

$f(x_0; y_0) = \sqrt{10} \quad \overline{x} = 10 \quad \overline{x_0} = 9 \quad \Delta\overline{x} = 1$

$f'(x) = (\sqrt{x})' = \frac{1}{2\sqrt{x}}$

$f(\overline{x}) \approx f(\overline{x_0}) + f'(x_0) \cdot \Delta\overline{x} = \sqrt{9} + \frac{1}{2\sqrt{9}} \cdot 1 =$

$= 3 + \frac{1}{6} = \frac{19}{6} \approx 3,1(6) \approx 3,2$

№ 11.3.21

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

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

$x = 28 \quad x_0 = 30 \quad \Delta x = -2$

$y = 61^\circ \quad y_0 = 60 \quad \Delta y = 1$

№ 11.3.22.

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

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

1) $f'_x(x,y) = ((\sin^2 x + 8e^y)^{5/2})' = \frac{5}{2}((\sin^2 x + 8e^y)^{3/2-1}) \cdot (2 \cdot \sin x \cdot (\sin x)'_x + 0) = \frac{5}{2} \cdot 2 \sin x \cdot \cos x \cdot (\sin^2 x + 8e^y)^{3/2}$

2) $f'_y(x,y) = ((\sin^2 x + 8e^y)^{5/2})' = \frac{5}{2}((\sin^2 x + 8e^y)^{5/2-1}) \cdot (0 + 8e^y) = \frac{5}{2} \cdot 8e^y (\sin^2 x + 8e^y)^{3/2} = 20e^y (\sin^2 x + 8e^y)^{3/2}$

3) $x = 1{,}55 \quad x_0 = 1{,}571 \quad \Delta x = -0{,}021$

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

4) $f(x_0; y_0) = (\sin^2 \frac{\pi}{2} + 8 \cdot e^0)^{5/2} = (1+8)^{5/2} = 9^{5/2} = \sqrt{9^5} = 243$

5) $f'_x(x_0; y_0) = (\frac{5}{2} \sin \pi)(\sin^2 \frac{\pi}{2} + 8e^0)^{3/2} = \frac{5}{2} \cdot 0 \cdot 9^{3/2} = 0$

6) $f'_y(x_0; y_0) = 20e^0 (\sin^2 \frac{\pi}{2} + 8e^0)^{3/2} = 20 \cdot 9^{3/2} = 20 \cdot 27 = 540$

7) $f(x; y) \approx 243 + 0 \cdot (-0{,}021) + 540 \cdot 0{,}015 \approx 243 + 0 + 8{,}1 = 251{,}1$