В 11 КМ 3 Красильникова Д. Д.

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6) $f(x,y) = \dfrac{x^3+y^3}{-2x^2+y^2}$

$f'(x) = \dfrac{(x^3+y^3)'(-2x^2+y) - (x^3+y^3)(-2x^2+y^2)'}{(-2x^2+y^2)^2} =$

$= \dfrac{3x^2(-2x^2+y) - (x^3+y^3)(-4x)}{(-2x^2+y^2)^2}$

$f'(y) = \dfrac{3y^2(-2x^2+y) - (x^3+y^3)(2y)}{(-2x^2+y^2)^2}$

7) $f(x,y,z) = \ln(\sqrt[7]{x^4} - x^2\sqrt{y} + y\cos\sqrt{z})$

$(\ln u)' = \dfrac{1}{u}(u)'$

$f'(x) = \dfrac{1}{\sqrt[7]{x^4} - x^2\sqrt{y} + y\cos\sqrt{z}} \cdot$

$\cdot (\sqrt[7]{x^4} - x^2\sqrt{y} + y\cos\sqrt{z})' = \dfrac{1}{\sqrt[7]{x^4} - x^2\sqrt{y} + y\cos z} \cdot$

$\cdot \left(\frac{4}{7}x^{\frac{4}{7}-1} - 2\sqrt{y}\,x\right) = \dfrac{\left(\frac{4}{7}x^{\frac{4}{7}-1} - 2\sqrt{y}\,x\right)}{\sqrt[7]{x^4} - x^2\sqrt{y} + y\cos\sqrt{z}}$

$f'(y) = \dfrac{1}{\sqrt[7]{x^4} - x^2\sqrt{y} + y\cos\sqrt{z}} \cdot \left(x^2 \cdot \frac{1}{2} \cdot y^{-1/2} + \cos\sqrt{z}\right) =$

$= \dfrac{\frac{x^2}{2\sqrt{y}} + \cos\sqrt{z}}{\sqrt[7]{x^4} - x^2\sqrt{y} + y\cos\sqrt{z}}$

$f'(z) = \dfrac{-y \cdot \sin\sqrt{z} \cdot \frac{1}{2\sqrt{z}}}{\sqrt[7]{x^4} - x^2\sqrt{y} + y\cos\sqrt{z}}$

$$8)\ f(x,y,z)=x^{\frac{2y}{3z^2}}$$

$$a^u = a^u \ln a\,(u)' \qquad u^a = a u^{\cancel{a-1}}\cdot (u^{*})'$$

$$f'(x)=\frac{2y}{3z^2}\cdot x^{\frac{2y}{3z^2}-1}\cdot(1)=\frac{2y}{3z^2}\cdot x^{\frac{2y}{3z^2}-1}$$

$$f'(y)=x^{\frac{2y}{3z^2}}\cdot \ln x\cdot\left(\frac{2y}{3z^2}\right)'=x^{\frac{2y}{3z^2}}\cdot \ln x\cdot \frac{2}{3z^2}$$

$$f'(z)=x^{\frac{2y}{3z^2}}\cdot \ln x\left(2y\cdot\frac{1}{3z^2}\right)'=x^{\frac{2y}{3z^2}}\ln x\left(\frac{2y}{3}\cdot\frac{(-2)}{z^{-3}}\right)$$

$$18)\ e^x+xz^2=y^2 \qquad M_0(0;1;1)$$

$$e^x+xz-y^2=0$$

$$F'(x)(x-x_0)+F'(y)(y-y_0)+F'(z)(z-z_0)=0$$

$$\begin{cases}F'(x)=e^x+z\\F'(y)=-2y\\F'(z)=x\end{cases} \qquad \begin{cases}F'(x)(M_0)=1+z\\F'(y)(M_0)=-2\\F'(z)=x\end{cases}$$

$$(1+z)(x-0)+(-2)(y-1)+x(x-1)=0$$

$$\frac{(x-0)}{1+z}=\frac{(y-1)}{-2}=\frac{(x-1)}{x}$$

19)

$$f(x,y,z)=-x^2-3y^2+3z-x+3y+3$$

$$l:\ \frac{x+1}{-5}=\frac{y-3}{9}=\frac{z+4}{3}$$

$$\vec{l}=\{-5;9;3\}$$

$$\begin{cases}F'(x)=2x-1\\F'(y)=-6y+3\end{cases}$$

$$\{F'(z) = 3$$

$$\begin{cases} F'_x(M_0) = 2x_0 - 1 \\ F'_y(M_0) = -6y_0 + 3 \\ F'_y(M_0) = 3 \end{cases}$$

$$\frac{2x_0 - 1}{-5} = \frac{-6y_0 + 3}{9} = \frac{3}{3}$$

$$\begin{cases} 2x_0 - 1 = -5 \\ -6y_0 + 3 = 9 \end{cases} \Rightarrow \begin{cases} x_0 = -2 \\ y_0 = -1 \end{cases}$$

$$-4 - 3 + 3z + 2 - 3 + 3 = 0$$

$$-5 = -3z$$

$$z = \frac{5}{3}$$

$$M_0 \{-2; -1; \frac{5}{3}\}$$

$$-5(x+2) + 9(y+1) + 3(z - \frac{5}{3}) = 0$$