КР по ФНП

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Вариант 9

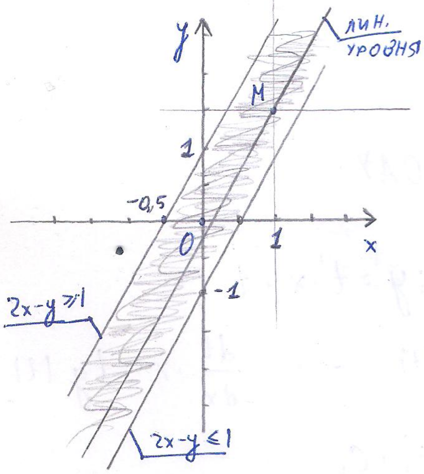
1. $z = \arcsin(2x-y)$; $A(1;3/2)$

Обл. опр: $-1 \le 2x-y \le 1 \to \begin{cases} 2x-y \le 1 \\ 2x-y \ge -1 \end{cases}$

Лин. уровня: $C = \arcsin(2x-y) \Rightarrow \arcsin(2\cdot 1 - \frac{3}{2}) \Leftrightarrow$

$\Leftrightarrow \arcsin\frac{1}{2} = \frac{\pi}{6}$

$\arcsin(2x-y) = \frac{\pi}{6}$



2. $u = e^{xyz}$; $M(2;3;1)$, $N(-1;1;5)$

$$\left.\begin{aligned} (u)'_x &= e^{xyz}\cdot yz; \ (u(M))'_x = 3e^6 \\ (u)'_y &= e^{xyz}\cdot xz; \ (u(M))'_y = 2e^6 \\ (u)'_z &= e^{xyz}\cdot xy; \ (u(M))'_z = 6\cdot e^6 \end{aligned}\right\} \text{grad } u = (3e^6; 2e^6; 6e^6)$$

$\overline{MN} = (-3;-2;-6)$; $|\overline{MN}| = \sqrt{9+4+36} = \sqrt{49} = 7$; $\overline{MN_0} = (-\frac{3}{7}; -\frac{2}{7}; -\frac{6}{7})$

$$\frac{\partial u}{\partial l_{MN}} = 3e^6\cdot\left(-\frac{3}{7}\right) + 2e^6\cdot\left(-\frac{2}{7}\right) + 6e^6\left(-\frac{6}{7}\right) = \frac{-49e^6}{7} = -7e^6$$

3. $\lim\limits_{\substack{x\to 0\\ y\to 0}} x\cdot\ln(y) = |y = kx| = \lim\limits_{\substack{x\to 0\\ kx\to 0}} (x\cdot\ln(kx)) = 0$, т.к. lim не зависит от $k \to$ предел существует

4. $z = f(u(x,y), v(x,y))$; $u = x\cos y$; $v = x\sin y$ | z'_x ; z'_y - ?

$f = (u\ln v - v\ln u)$

$z'_x = z'_u\cdot u'_x + z'_v\cdot v'_x$

$z'_x = (\ln v - \frac{v}{u})\cdot\cos y + (\frac{u}{v} - \ln(u))\cdot\sin y$

$z'_y = (\ln v - \frac{v}{u})\cdot(-x\cdot\sin y) + (\frac{u}{v} - \ln(u))\cdot x\cdot\cos y$

5. $z(x,y)$; $A(1;1;1)$; $3x-y-z = \cos(z-y)$; dz - ? $z(0,8;0,8)$ - ?

$f(x,y,z) = 3x-y-z-\cos(z-y)$

$$\left.\begin{aligned} z'_x &= -\frac{f'_x}{f'_z} = -\frac{3}{-1+\sin(z-y)} = \frac{3}{1-\sin(z-y)}; \ (z(A))'_x = 3 \\ z'_y &= -\frac{f'_y}{f'_z} = \frac{-1-\sin(z-y)}{-1+\sin(z-y)} = \frac{-1-\sin(z-y)}{1-\sin(z-y)}; \ (z(A))'_y = -1 \end{aligned}\right\} \Rightarrow dz = z'_x\Delta x + z'_y\Delta y = 3\Delta x - 1\Delta y$$

$z(0,8;0,8)$: $\begin{cases} x = x_0 + \Delta x \\ y = y_0 + \Delta y \end{cases} \to \begin{cases} x = 1 - 0,2 \\ y = 1 - 0,2 \end{cases}$

$z(0,8;0,8) \approx z(1;1) + dz$

$z(0,8;0,8) \approx 1 + 3\cdot(-0,2) - 1\cdot(-0,2) = 0,6$