11.04.2013г. ДИС- ~~лекция~~ упражнение (край на сними)

$F_1(x, y, z, u, v) = 0$
$F_2(x, y, z, u, v) = 0$
$F_3(x, y, z, u, v) = 0$

$z(x, y)$, $u(x, y)$, $v(x, y)$

$$\begin{vmatrix} F'_z & F'_u & F'_v \\ G'_z & G'_u & G'_v \\ H'_z & H'_u & H'_v \end{vmatrix} \neq 0$$

$x = t + \frac{1}{t}$

$y = t^2 + \frac{1}{t^2}$

$z = t^3 + \frac{1}{t^3}$

$y(x)$ $z(x)$ $t(x)$

$$\begin{vmatrix} 1 - \frac{1}{t^2} & 2t - \frac{2}{t^3} & 3t^2 - \frac{3}{t^4} \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{vmatrix} = 1 - \frac{1}{t^2} \neq 0$$

$t + \frac{1}{t} - x = 0$

$t^2 + \frac{1}{t^2} + y = 0$

$t^3 + \frac{1}{t^3} + z = 0$

$x = t + \frac{1}{t}$ $y = \left(t + \frac{1}{t}\right)^2 - 2$ $\left(t + \frac{1}{t}\right)^3 = t^3 + \frac{1}{t^3} + 3\left(t + \frac{1}{t}\right)$

$y(x) = x^2 - 2$

$z = x^3 - 3x$

z $z(x) = x^3 - 3x$

$t^2 - tx + 1 = 0$

$D = t^2 + 4t^2$ $t = \frac{x \pm \sqrt{x^2 - 4}}{2}$

$$x = t(x) + \frac{1}{t(x)}$$

$$y(x) = t^2(x) + \frac{1}{t^2(x)}$$

$$z(x) = t^3(x) + \frac{1}{t^3(x)}$$

$$y'(x) = \left(2t - \frac{2}{t^3}\right) t'(x) = 2\frac{t^4-1}{t^3} \cdot \frac{t^2}{t^2-1} = 2\frac{t^2+1}{t} = 2\left(t + \frac{1}{t}\right) = 2x$$

$$1 = t' - \frac{1}{t^2} \cdot t' \Rightarrow t' = \frac{t^2}{t^2-1}$$

$$y'' = (\quad)' \cdot t'$$

задачи

$x = u + v$

$y = u^2 + v^2$

$z = u^3 + v^3$

$x = u + v$

(x, y)

I по u v z
II по u v z
III по u v z

$$\begin{vmatrix} 1 & 1 & 0 \\ 2u & 2v & 0 \\ 3u & 3v & -1 \end{vmatrix} = -2v + 2u$$

$$z(x,y) = u^3(x,y) + v^3(x,y)$$

$$z'_x = 3u^2(x,y)u_x + 3v^2(x,y)u'$$

$x = u(x,y) + v(x,y)$ (по x)' $\quad 1 = u'_x + v'_x$

$y = u^2(x,y) + v^2(x,y) \quad 0 = 2u(x,y)u'_x + 2v(x,y)v'_x$

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$u'_x = 1 - v'_x$

$u - uv'_x + vv'_x = 0$

$$u'_x = \frac{\begin{vmatrix} 1 & 1 \\ 0 & 2v \end{vmatrix}}{\begin{vmatrix} 1 & 1 \\ 2u & 2v \end{vmatrix}} = \frac{v}{v-u}$$

$$v'_x = \frac{1-u}{v-u}$$

$$z'_x = \frac{3u^2v - 3v^2u}{v-u} = 3uv$$

$z_x' = 3u^2 \cdot u'_x + 3v^2 v'_x = -3uv$

$z_{xy}'' = -3u'_y v - 3v'_y u$

$0 = u'_y + v'_y$ $\quad$ ($'$ по y)

$1 = 2u \cdot u'_y + 2v\, v'_y = u'_y(2u - 2v)$

$$u'_y = -v'_y = \frac{1}{2(u-v)}$$