$\left(-\frac{1}{1-\frac{x}{y}} \cdot 2\sqrt{\frac{x}{y}} \cdot \frac{1}{y}\right)^2 \quad (y-x)\,2\sqrt{y} \quad 2 \quad (y-x)\left|\frac{x}{y}\right|$

$(y-x)^{-1} \cdot \left(\frac{x}{y}\right)^{-\frac{1}{2}}$ ²

№ 3145

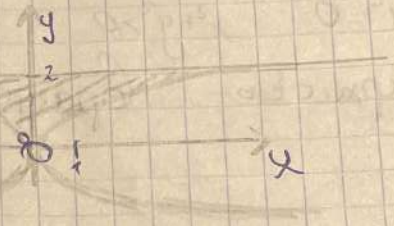
а) $1{,}002 \cdot 2{,}003^2 \cdot 3{,}004^3$

Домашняя работа

№ 3146

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

$D(u): \begin{cases} -1 \le \frac{x}{y^2} \le 1 & y \neq 0 \\ -1 \le 1-y \le 1 & 0 < y \le 2 \end{cases}$



$\frac{x}{y^2} \ge -1 \qquad \frac{x}{y^2} \le 1$

$\frac{x+y^2}{y^2} \ge 0 \qquad \frac{x-y^2}{y^2} \le 0$

$y^2 \ge -x \qquad y^2 = +x$

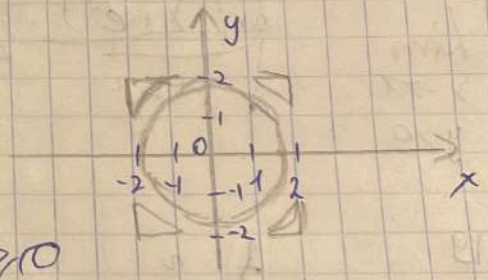
№ 3147

$u = \sqrt{\sin(x^2+y^2)}$

$D(x)$ $\sin x = R$

$D(u)$ $0 < x^2+y^2 < \infty \qquad \sin(x^2+y^3) \ge 0$

$u \in R; \qquad 0 \le u \le 1$



№ 3159.2

$z = \max(|x|, |y|)$ $z = C$

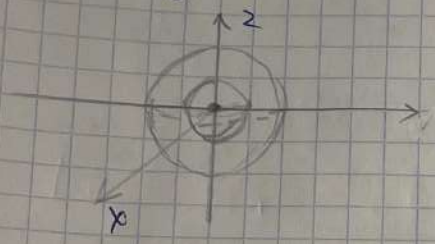
$\max(|x|, |y|) = 0$ $\max(|x|, |y|) > 0$

$x = 0$ $y = 0$ при $C = 0$

№ 3167

$u = x^2 + y^2 + z^2$ $u = e$

$x^2 + y^2 + z^2 = 0$ - сфера $x^2 + y^2 + z^2 > 0$



№ 3172 $z = f(\sqrt{x^2 + y^2})$

$x^2 + y^2 = 0$ $x^2 + y^2 > 0$

Поверхность вращения кривой $z = f(x)$, $y = 0$ вокруг оси Oz.

№ 3191

$$\lim_{\substack{x \to \infty \\ y \to a \to 0}} \left(1 + \frac{1}{x}\right)^{x^2/(x+y)} = e$$

№ 3192

$$\lim_{\substack{x \to 1 \\ y \to 0}} \frac{\ln(x + e^y)}{\sqrt{x^2 + y^2}} = \frac{\ln(1+1)}{1} = \ln(2)$$

№ 3219

$u = \operatorname{tg} \frac{x^2}{y}$

$\frac{\partial u}{\partial x} = u'_x$ $\frac{\partial u}{\partial x} = \frac{1}{\cos^2\left(\frac{x^2}{y}\right)} \cdot \frac{2x}{y} = \sec^2\left(\frac{x^2}{y}\right) \cdot \frac{2x}{y}$

$$\frac{\partial u}{\partial y} = u'_y = \frac{1}{\cos^2\left(\frac{x^2}{y}\right)} \cdot \frac{1 \cdot x^2}{y^2} = -\frac{\sec^2\left(\frac{x^2}{y}\right) \cdot x^2}{y^2}$$

$$\frac{\partial^2 u}{\partial x^2} = \frac{2}{y}\sec^2\left(\frac{x^2}{y}\right) + \frac{8x^3}{y^2}\sin\left(\frac{x^2}{y}\right) \cdot \sec^3\left(\frac{x^2}{y}\right)$$

$$\frac{\partial^2 u}{\partial y^2} = + \frac{2}{y^3}\frac{x^2}{y^3}\sec^2\left(\frac{x^2}{y}\right) + \frac{2x^4}{y^4}\sin\frac{x^2}{y}\sec^3\left(\frac{x^2}{y}\right)$$

№ 3220

$u = x^y$

$$\frac{\partial u}{\partial x} = u'_x = y x^{y-1}$$

$$\frac{\partial u}{\partial y} = u'_y = x^y \cdot \ln x$$

$$\frac{\partial^2 u}{\partial x^2} = (y^2 - y) x^{y-2}$$

$$\frac{\partial^2 u}{\partial y^2} = \ln^2 x \, x^y$$

№ 3229

$u = x^y$

$$\frac{\partial^2 u}{\partial x} = y x^{y-1}$$

$$\frac{\partial^2 u}{\partial x \partial y} = x^{y-1} + y \cdot \frac{x^y \ln x}{x} =$$

$$\frac{\partial u}{\partial y} = x^y \cdot \ln x$$

$$\frac{\partial^2 u}{\partial y \partial y} = \frac{x \cdot y}{x} + \ln x \cdot y \cdot x^{y-1} =$$

№ 3238

$u = \ln\sqrt{x^2 + y^2}$

$$du = \frac{1}{\sqrt{x^2+y^2}} \cdot \frac{1}{2\sqrt{x^2+y^2}} \cdot (2x dx + 2y dy) = \frac{2(x dx + y dy)}{2(x^2+y^2)}$$

$$d^2u = \frac{(y^2 - x^2)(dx^2 - dy^2) - 4xy\,dx\,dy}{(x^2+y^2)^2}$$

№ 3245

$$f(x) = f(x_0) + f'(x_0)(x - x_0)$$

$$y = \frac{1,03^2}{\sqrt[3]{0,98\sqrt{1,05^3}}}$$

а) $x = 1$

$\Delta x = 0,03$

$1 + 2 \cdot 1 \cdot 0,03 = 1,06$

б) $x = 1$

$\Delta x = 0,05$

$1 + \frac{3}{4} \cdot \frac{1}{\sqrt[4]{1}} \cdot 0,05 \approx 1,0375$

в) $\sqrt[3]{1,01675}$

$x = 1$

$\Delta x = 0,01675$

$1 + \frac{1}{3} \cdot \frac{1}{\sqrt[3]{1^2}} \cdot 0,01675 \approx 1,005588$

№ 3269

d^3u

$u = x^3 + y^3 - 3xy(x-y)$

$du = 3x^2 dx + 3y^2 dy - 3(y(x-y) + x(x-y) - xy)$

$d^2u = 6x dx^2 + 6y dy^2 - (3y(x-y) - 3x(x-y) + 3xy)' \cdot 6x + 6y + 3y - 3y(x-y)$

$+ 3x - 3x(x-y) + 3x + 3y)$

$d^3u = 6 dx^3 + 6 dy^2 + 3 - 3(x-y) + 3y + 3 - 3(x-y) + 3x + 3 + 3) =$

$6 dx^3 + 6 dy^3 = 18 dx^2 dy + 3 dx dy^2 = 6(dx^3 - 3dx^2 dy + 3dx dy^2 + dx^3)$