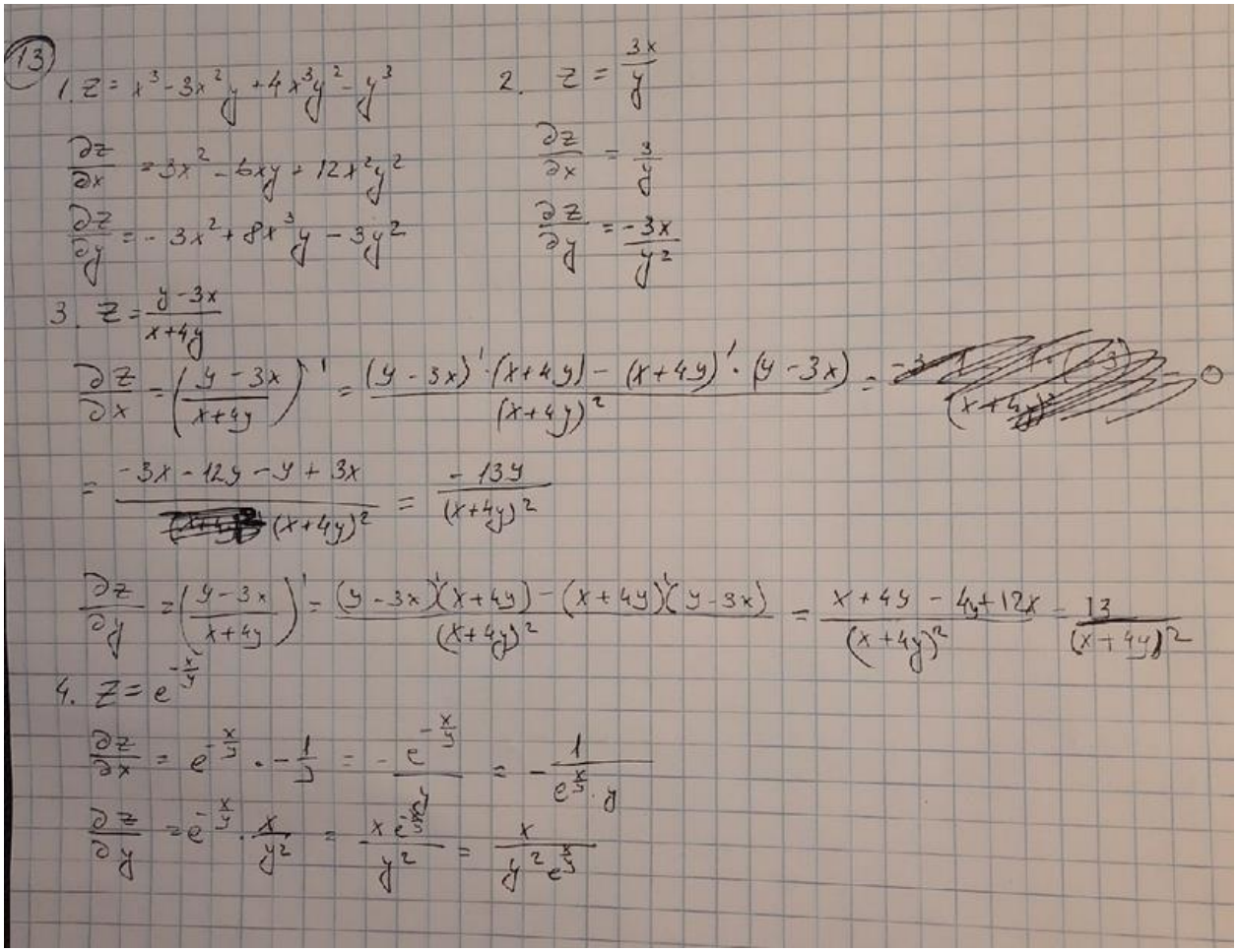
Эрдниев 219/4
Номера 13,14,15



5. $z = \ln(2x - y)$

$$\frac{\partial z}{\partial x} = \frac{2}{2x-y}$$

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

(14)

1. $z = \frac{x-2y}{x+y}$ $\quad M(2;-1)$

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

$$\frac{\partial z}{\partial x}(2;-1) = \frac{-3}{(2-1)^2} = -3$$

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

$$\frac{\partial z}{\partial x}(2;-1) = \frac{-6}{(2-1)^2} = -6$$

2. $z = e^{\frac{3x}{y}}$ $\quad M(1,1)$

$$\frac{\partial z}{\partial x} = e^{\frac{3x}{y}} \cdot \frac{3}{y} = \frac{3e^{\frac{3x}{y}}}{y} \qquad \frac{\partial z}{\partial x}(1;1) = 3e^3$$

$$\frac{\partial z}{\partial y} = -\frac{e^{\frac{3x}{y}} \cdot 3x}{y^2} \qquad \frac{\partial z}{\partial y}(1;1) = -3e^3$$

3. $z = \ln(x^2+y^2)$ $\quad M(2;-2)$

$$\frac{\partial z}{\partial x} = \frac{2x}{x^2+y^2} \qquad \frac{\partial z}{\partial x}(2;-2) = \frac{1}{2}$$

$$\frac{\partial z}{\partial y} = \frac{2y}{x^2+y^2} \qquad \frac{\partial z}{\partial y} = -\frac{1}{2}$$

4. $z = \frac{y}{x} + x$ $\quad M(1;-2)$

$$\frac{\partial z}{\partial x} = -\frac{y}{x^2} + 1 \qquad \frac{\partial z}{\partial x}(2;-1) = 3$$

$$\frac{\partial z}{\partial y} = \frac{1}{x} \qquad \frac{\partial z}{\partial y} = 1$$

(15)

1. $z = \frac{y}{x+y}$ $M(2;-1)$

$\frac{\partial z}{\partial x} = \left(y \cdot \frac{1}{x+y}\right)' = \frac{-y}{(x+y)^2}$ $\frac{\partial z}{\partial x}(2;-1) = \frac{-(-1)}{(2-1)^2} = 1$

$\frac{\partial z}{\partial x} = \frac{y'(x+y) - (x+y)'y}{(x+y)^2} = \frac{x+y-y}{(x+y)^2} = \frac{x}{(x+y)^2}$

$\frac{\partial z}{\partial x}(2;-1) = \frac{2}{(2-1)^2} = 2$

$dz = dx + 2dy$

2. $z = \sin(x^2 + 2y)$ $x = 1$ $y = 2$

$dx = 0,1$

$dy = 0,2$

$z'_x = \cos(x^2+2y) \cdot 2x = 0,56$

$z'_y = 2\cos(x^2+2y) = 0,56$

$dz = 0,56 \cdot 0,1 + 0,56 \cdot 0,2 = 0,168$

3. $z = e^{\frac{x}{2y}}$ $x = 2$ $y = 1$

$dx = 0,2$ $dy = 0,1$

$z'_x = e^{\frac{x}{2y}} \cdot \frac{1}{2y} = \frac{e}{2}$

$z'_y = e^{\frac{x}{2y}} \cdot \left(-\frac{x}{2y^2}\right) = -e$

$dz = \frac{e}{2} \cdot 0,2 + (-e) \cdot 0,1 = 0$

4. $z = \ln(2x+y)$ $M(1;0)$

$z'_x = \frac{1}{2x+y} \cdot 2 = 1$

$z'_y = \frac{1}{2x+y} = \frac{1}{2}$

$dz = dx + \frac{dy}{2}$