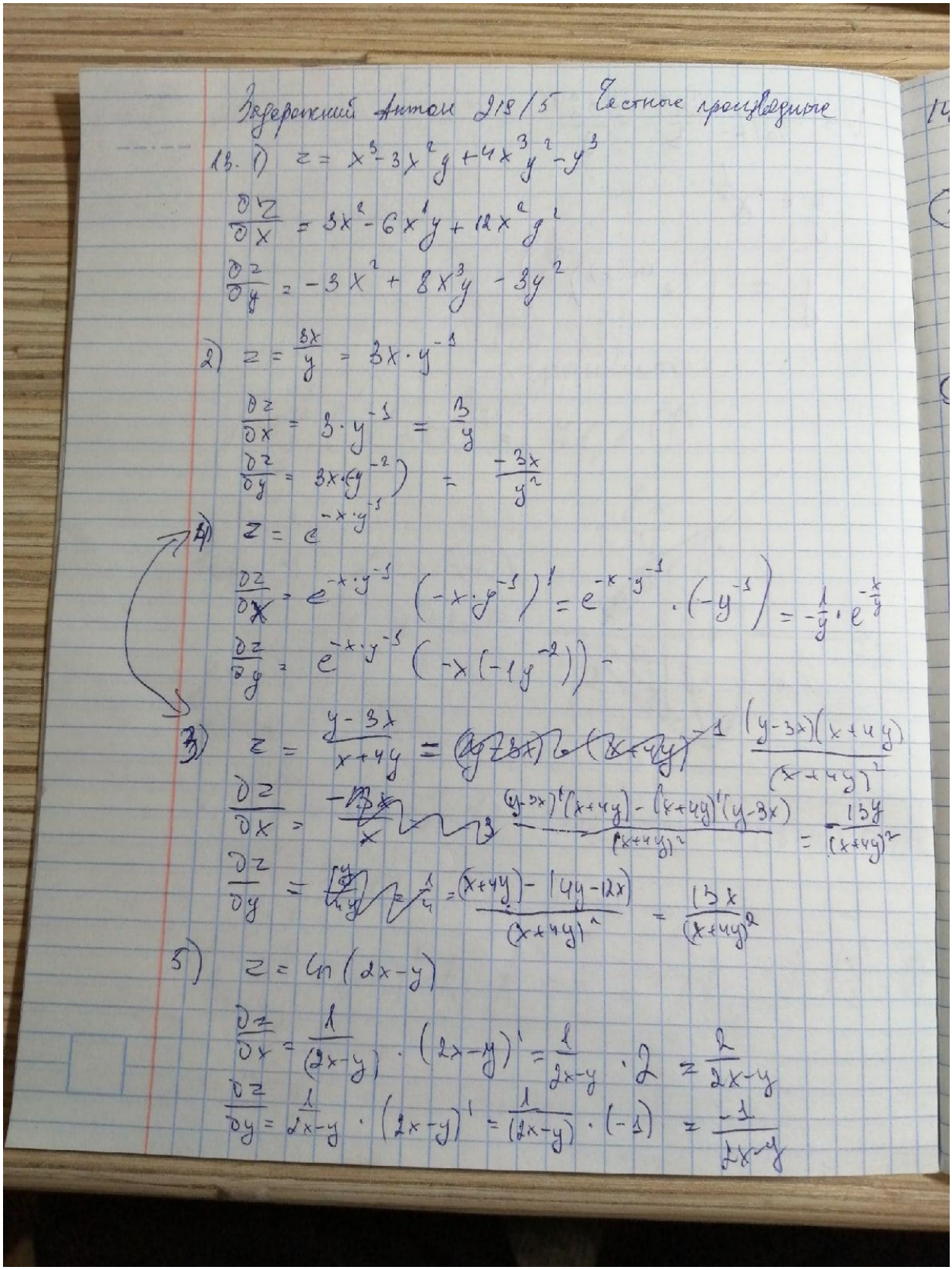
Задорожний Антон 219/5



14. 1) $z = \frac{x-2y}{x+y}$

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

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

① $M(2;-1) \Rightarrow \frac{-3}{1} = -3$

② $M(2;-1) \Rightarrow \frac{-6}{1} = -6$

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

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

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

3) $z = \ln(x^2+y^2)$

$\frac{\partial z}{\partial x} = 2x \frac{1}{x^2+y^2}$ $\quad M(2;2) = 4 \cdot \frac{1}{8} = \frac{1}{2}$

$\frac{\partial z}{\partial y} = 2y \frac{1}{x^2+y^2}$ $\quad M(2;2) = \frac{4}{8} = \frac{1}{2}$

4) $z = \frac{y}{x} + x$

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

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

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

$\frac{\partial z}{\partial x} = -\frac{y}{x^2} = \frac{1}{4}$

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

$dz = \frac{1}{4}dx + 2dy$

2) $z = (x^2 + 2y)$ $x=1$ $y=2$ $dx = 0,1$ $dy = 0,2$

$\frac{\partial z}{\partial x} = \cos(x^2+2y)2x = 2\cos(5)$

$\frac{\partial z}{\partial y} = \cos(x^2+2y)2 = 2\cos(5)$

$dz = ?$

3) $z = e^{\frac{x}{2y}}$ $x=2$; $y=1$; $dx = 0,2$; $dy = 0,1$

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

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

$dz = \frac{1}{2}e \cdot \frac{1}{5} + \left(-\frac{1}{2}e\right)\cdot\frac{1}{10} = -\frac{e}{10}$

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

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

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

$dz = 1dx + 0,5dy$