

Зад 7, пункт 5

$$U = \log_{21}(x^2 + y^2 + z^2) \quad F(-19, 8, -4), \text{ или просто } \text{направление}$$

$$U'_x = \frac{2x}{\log_{21}(x^2 + y^2 + z^2)} \rightarrow \frac{2 \cdot (-19)}{\log_{21}((-19)^2 + 8^2 + (-4)^2)} = \frac{-38}{\log_{21} 441} = -19$$

$$U'_y = \frac{2y}{\log_{21}(x^2 + y^2 + z^2)} \rightarrow \frac{2 \cdot 8}{\log_{21} 441} = 8$$

$$U'_z = \frac{2z}{\log_{21}(x^2 + y^2 + z^2)} \rightarrow \frac{2 \cdot (-4)}{\log_{21} 441} = -4$$

$$\text{grad } U = (-19; 8; -4)$$

$$|\text{grad } U| = \sqrt{(-19)^2 + 8^2 + (-4)^2} = \sqrt{441} = 21$$

$$\text{grad } U_0 = \left( \frac{-19}{21}, \frac{8}{21}, \frac{-4}{21} \right)$$

$$U'_{\text{grad } U} = (\text{grad } U_0 \cdot \text{grad } U)$$

$$\begin{aligned} U'_{\text{grad } U} &= -\frac{19}{21} \cdot (-19) + \frac{8}{21} \cdot 8 + \left( -\frac{4}{21} \cdot (-4) \right) = \\ &= \frac{361}{21} + \frac{64}{21} + \frac{16}{21} = 21 \end{aligned}$$