(Урок 7 задание 3)

$u = x^2 + y^2 + z^2$ $\quad \vec{c}(-9; 8; -12)$ $M(8; -12; 9)$

$u'_x = 2x$; $u'_y = 2y$; $u'_z = 2z$

$\text{grad}\, u \ (u'_x; u'_y; u'_z)$

$\text{grad}\, u \ (16; -24; 18)$ в точке M.

$$u'_{\vec{c}} = 16 \cdot \left(-\frac{9}{17}\right) + \left(-24 \cdot \frac{8}{17}\right) + \left(18 \cdot \frac{-12}{17}\right) = -\frac{144}{17} - \frac{192}{17} - \frac{216}{17} = -\frac{552}{17}$$

$$|\vec{c}| = \sqrt{(-9)^2 + 8^2 + (-12)^2} = \sqrt{81 + 64 + 144} = \sqrt{289} = 17$$

$$\vec{c}_0 = \frac{\vec{c}}{|\vec{c}|} = \left(-\frac{9}{17}; \frac{8}{17}; -\frac{12}{17}\right)$$