$$\nabla T = -400e^{-x^2-3y^2-9z^2}\langle x, 3y, 9z\rangle$$

(a) $\mathbf{u} = \frac{1}{\sqrt{6}}\langle 1, -2, 1\rangle$, $\nabla T(2, -1, 2) = -400e^{-43}\langle 2, -3, 18\rangle$ and
$$D_{\mathbf{u}} T(2, -1, 2) = \left(-\frac{400e^{-43}}{\sqrt{6}}\right)(26) = -\frac{5200\sqrt{6}}{3e^{43}} \, ^\circ\text{C}/ \text{ m}.$$

(b) $\nabla T(2, -1, 2) = 400e^{-43}\langle -2, 3, -18\rangle$ or equivalently $\langle -2, 3, -18\rangle$.

(c) $|\nabla T| = 400e^{-x^2 - 3y^2 - 9z^2}\sqrt{x^2 + 9y^2 + 81z^2} \, ^\circ\text{C}/ \text{ m}$ is the maximum rate of increase. At $(2, -1, 2)$ the maximum rate of increase is $400e^{-43}\sqrt{337} \, ^\circ\text{C}/$ m.