

$$8. \quad x^2 + y^2 - 5z = 0 \quad (3, 1, 2)$$

$$\begin{aligned} \textcircled{1} \quad \nabla f &= f_x \vec{i} + f_y \vec{j} + f_z \vec{k} \\ &= 2x \vec{i} + 2y \vec{j} - 5 \vec{k} \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad \nabla f(3, 1, 2) &= 2(3) \vec{i} + 2(1) \vec{j} - 5 \vec{k} \\ &= 6 \vec{i} + 2 \vec{j} - 5 \vec{k} \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad \|\nabla f(3, 1, 2)\| &= \sqrt{6^2 + 2^2 + (-5)^2} \\ &= \sqrt{36 + 4 + 25} \\ &= \sqrt{65} \end{aligned}$$

$$\textcircled{4} \quad \theta = \cos^{-1} \left[ \frac{|\nabla f(3, 1, 2) \cdot \vec{k}|}{\|\nabla f(3, 1, 2)\|} \right]$$

$$\theta = \cos^{-1} \left[ \frac{|(6\vec{i} + 2\vec{j} - 5\vec{k}) \cdot (\vec{k})|}{\sqrt{65}} \right]$$

$$\theta = \cos^{-1} \left[ \frac{|-5(1)|}{\sqrt{65}} \right]$$

$$\theta = \cos^{-1} \left( \frac{5}{\sqrt{65}} \right)$$

$$\theta = 51.67^\circ$$