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

① $\nabla f = f_x \vec{i} + f_y \vec{j} + f_z \vec{k}$

$= 2x\vec{i} + 2y\vec{j} - 5\vec{k}$

② $\nabla f(3,1,2) = 2(3)\vec{i} + 2(1)\vec{j} - 5\vec{k}$

$= 6\vec{i} + 2\vec{j} - 5\vec{k}$

③ $\| \nabla f(3,1,2) \| = \sqrt{6^2 + 2^2 + (-5)^2}$

$= \sqrt{36 + 4 + 25}$

$= \sqrt{65}$

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

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

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

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

$\theta = 51.67°$