8) $a=3, b=0 \Rightarrow f(x,y,z) = x + 3y + z$

$g_1(x,y,z) = x - y + z - 1 = 0 \quad , \quad g_2(x,y,z) = x^2 + y^2 - 1 = 0$

$\nabla f = \lambda \nabla g_1 + \mu \nabla g_2 \Rightarrow (1, 3, 1) = \lambda(1, -1, 1) + \mu(2x, 2y, 0)$

$\Rightarrow 1 = \lambda + 2\mu x \; ①, \quad 3 = -\lambda + 2\mu y \; ②, \quad 1 = \lambda \; ③$

$①, ③ \Rightarrow 2\mu x = 0$
$②, ③ \Rightarrow 2\mu y = 5$ $\Biggr\} \xrightarrow{\mu \neq 0} x = 0, y = \dfrac{5}{2\mu}$

$x^2 + y^2 = 1 \Rightarrow 0^2 + \dfrac{25}{4\mu^2} = 1 \Rightarrow \mu = \pm \dfrac{5}{2}$

$\mu = \dfrac{5}{2} \Rightarrow y = 1 \quad , \quad x - y + z = 1 \Rightarrow z = 2$

$\mu = -\dfrac{5}{2} \Rightarrow y = -1 \quad , \quad x - y + z = 1 \Rightarrow z = 0$

$P = (0, 1, 2), \quad Q = (0, -1, 0)$

$f(P) = 0 + 3 + 2 = 9 \quad , \quad f(Q) = 0 - 3 + 0 = -3$

$f(P) > f(Q) \Rightarrow$ مقدار ماکزیمم مطلق تابع f در نقطه $P = (0, 1, 2)$ رخ می‌دهد