(8) $f(x,y,z) = 2x + 2y + z$ $\quad x^2+y^2+z^2 = 9$

$\nabla f = \lambda \nabla g$

$\langle 2,2,1 \rangle = \lambda \langle 2x, 2y, 2z \rangle$ $\quad x^2+y^2+z^2=9$

$2 = \lambda 2x \quad 2 = \lambda 2y \quad 1 = \lambda 2z \quad x^2+y^2+z^2=9$

$\lambda = \frac{1}{x} \quad \lambda = \frac{1}{y} \quad \lambda = \frac{1}{2z}$

$\frac{1}{x} = \frac{1}{y} \quad \frac{1}{x} = \frac{1}{2z} \quad x^2+y^2+\frac{1}{4}x^2 = 9$

$x = y \quad x = 2z \quad \frac{9}{4}x^2 = 9$

$z = \frac{1}{2}x \quad x^2 = 4$

$x = \pm 2$

$y = \pm 2$

$z = \pm 1$

Points: $(-2,-2,-1)$, $(-2,-2,1)$

$(-2,2,-1)$, $(-2,2,1)$

$(2,-2,-1)$, $(2,-2,1)$; $(2,2,-1)$, $(2,2,1)$

$f(-2,-2,-1) = -9 \quad f(-2,-2,1) = -7 \quad f(-2,2,-1) = -1 \quad f(-2,2,1) = 1$

$f(2,-2,-1) = -1 \quad f(2,-2,1) = 1 \quad f(2,2,-1) = 7 \quad f(2,2,1) = 9$

minimum: $f(-2,-2,-1) = -9$ $\quad$ maximum $f(2,2,1) = 9$