$$f_{(x_1, x_2, x_3)} = -3x_1^2 + x_2^2 + 2x_5^2 + 2(x_1 + x_2 + x_3) \qquad .29$$

P $\quad \nabla f + v \nabla h = 0$

$$\Rightarrow -6x_1 + 2 + 2vx_1 = 0 \;,\; 2x_2 + 2 + 2vx_2 = 0,\; 4x_3 + 2 + 2vx_3 = 0$$

$$\Rightarrow x_1 = \frac{1}{(v-3)} \;,\; x_2 = \frac{1}{v+1} \;,\; x_3 = \frac{1}{v+2}$$

$$\Rightarrow 1 = \frac{1}{(v-3)^2} + \frac{1}{(v+1)^2} + \frac{1}{(v+2)^2}$$

$$v = -3.15 \qquad v = 0.22 \qquad v = 1.89 \qquad v = 4.04$$

$$x = (0.16, 0.47, -0.87) \qquad x = (0.36, -0.82, 0.45)$$

$$x = (0.90, -0.35, 0.26) \qquad x = (-0.97, -0.20, 0.17)$$

$$f_{0(x)} = 1.17 \qquad f_{0(x)} = 0.67 \qquad f_{0(x)} = -0.56 \qquad f_{0(n)} = -4.70$$

$$\boxed{v^* = 4.04}$$