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18-660
HW 9

$z = \begin{bmatrix} x \\ y \end{bmatrix}$

$L(z, U, V) = f(z) + V_1 g_1(z)$

$= x^2 + y^2 + V_1(x + y - 1)$

$d(U, V) = \inf_z L(z, U, V)$

$= \inf_{x,y} [x^2 + y^2 + V_1(x + y - 1)]$

$= \min_{x,y} x^2 + y^2 + V_1(x + y - 1)$

$\frac{d}{dx} = 2x + V_1$

$\frac{d}{dy} = 2y + V_1$

min at $x, y = \frac{-V_1}{2}$

$d(U, V) = \frac{V_1^2}{4} + \frac{V_1^2}{4} - \frac{V_1^2}{2} - \frac{V_1^2}{2} - V_1$

$= \frac{-V_1^2}{2} - V_1$