\[ g(x, y) = x^2 - y^2 - 2x \]
\[ g_x(x, y) = 2x - 2 = 0 \]
\[ g_y(x, y) = -2y = 0 \]

There is a critical point at \((1, 0)\), but it is not in \(R\).

Along \(y = x^2\): \[ g(x, 1) = g(x, x^2) = x^2 - x^4 - 2x = u(x) \quad -2 \leq x \leq 2 \]

\[ u'(x) = 2x - 4x^3 - 2 = 0 \]

\[ \iff 4x^3 - 2x + 2 = 0 \iff 2(2x^3 - x + 1) = 0 \]

\[ \iff 2(x^3 - 2x + 1)(x + 1) = 0 \]

\[ \iff x = -1 \]

\[ u(-1) = 2 \quad \text{[This is } g(-1, 1) = 2] \]
\[ u(-2) = -8 \quad \text{[This is } g(-2, 4) = -8] \]
\[ u(2) = -16 \quad \text{[This is } g(2, 4) = -16] \]
Along $y = 4$: $g(x, 4) = x^2 - 16 - 2x = v(x)$, $-2 \leq x \leq 2$

$v'(x) = 2x - 2 = 0 \Rightarrow x = 1$

$v(1) = -17$ [This is $g(1, 4) = -17$]

$v(-2)$ and $v(2)$ were computed earlier since they correspond to $g(-2, 4)$ and $g(2, 4)$.

So there is an absolute minimum of $-17$ at $(1, 4)$ and an absolute maximum of $2$ at $(-1, 1)$. 