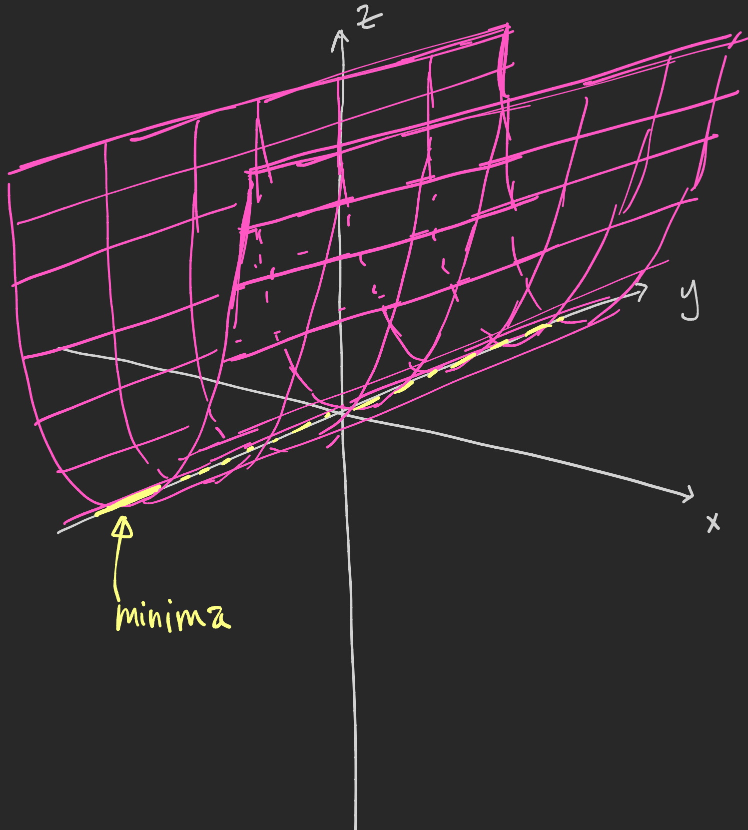


① Identify critical points:

$$\nabla f = \vec{0} \quad \text{(or DNE)}$$

$$\begin{cases} 2x = 0 \\ 0 = 0 \end{cases}$$

So the critical pts are all pts of the form $(0, b)$, i.e. the y-axis.

② Classify them:

$$\det H_f(0,b) = \det \begin{bmatrix} f_{xx}(0,b) & f_{xy}(0,b) \\ f_{yx}(0,b) & f_{yy}(0,b) \end{bmatrix}$$

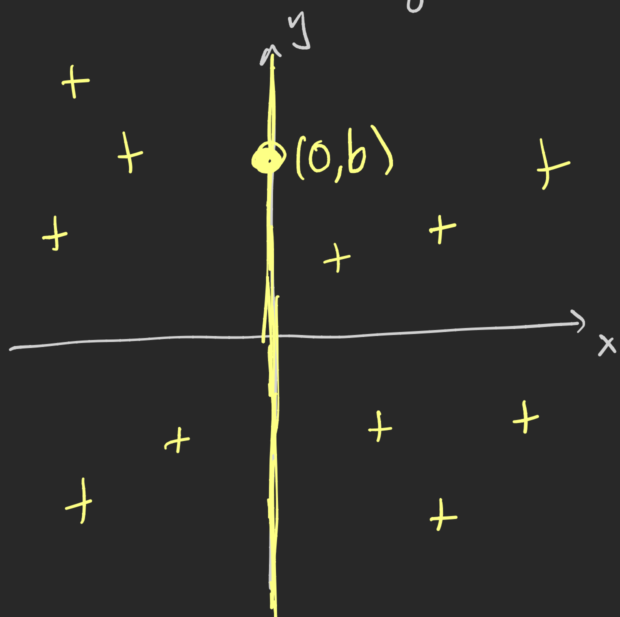
$\parallel$

D

$$= \det \begin{bmatrix} 2 & 0 \\ 0 & 0 \end{bmatrix} = 0.$$

$D = 0 \Rightarrow$ 2nd deriv test is inconclusive :(

Need to resort to adhoc analysis of f:



To figure out whether (a,b) is a absolute min:

"Is it true that $f(x,y)$ is always at least as big as $f(a,b)$?"

In our example: $f(0,b) = 0^2 = 0$.

$f(x,y) = x^2 \geq 0$ so <u>YES</u>.

(An absolute min is automatically also a local min.)

To figure out whether (a,b) is a local min:

"Can I draw a circle around (a,b) so that, <u>within that circle</u>, $f(x,y)$ is always at least as big as $f(a,b)$?"