

GRAPHING

- Level curves near an extremum will be approximately elliptical

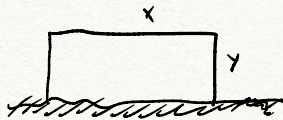


- Level curves near a (true) saddle point will be hyperbolic



CONSTRAINED OPTIMIZATION

How to maximize area of enclosure built against existing wall w/ 400m of fencing material?



i.e. maximize $A(x,y) = xy$ w/ $x + 2y = 400$

$$\begin{aligned} \textcircled{1} \quad x &= 400 - 2y \\ A &= (400 - 2y)y = 400y - 2y^2 \\ \Rightarrow A'(y) &= 400 - 4y \\ &= 4(100 - y) \\ 77 &= 100 \\ x &= 200 \end{aligned}$$

③ Parameterize, starting at $\vec{x} = (0, 200) + t(400, -200)$, $t = [0, 1]$

$$\begin{aligned} \Rightarrow A(x,y) &= A(t) = (1400t)(200 - 200t) \\ &= 280,000t - 80,000t^2 \\ A'(t) &= 80,000 - 160,000t \end{aligned}$$

