

$$1 \left[\sup_{t \in B(h)} \frac{t^T \nabla Y(0)}{\sqrt{v}} > \kappa/3 \right]$$

maxed at $t = \frac{\nabla Y(0) |h|}{\|\nabla Y(0)\|}$
 $t = \frac{Y(0) |h|}{\|Y(0)\|}$

$$= 1 \left[\|\nabla Y(0)\| |h| / \sqrt{v} > \kappa/3 \right]$$

$$= 1 \left[\|\nabla Y(0)\| |h| / \sqrt{v} > \kappa/3, \frac{|h| \|\nabla Y(0) - \nabla Y(t)\|}{\sqrt{v}} > \kappa/3 \right]$$

$$+ 1 \left[\|\nabla Y(0)\| |h| / \sqrt{v} > \kappa/3, \frac{|h| \|\nabla Y(0) - \nabla Y(t)\|}{\sqrt{v}} < \kappa/3 \right]$$

$$\leq 1 \left[\frac{|h| L \|t\|}{\sqrt{v}} > \kappa/3 \right] \quad \begin{array}{l} \text{okay} \\ \text{as } L \text{ is } \nabla^2 Y(t) \\ \text{non-degen} \end{array}$$

$$+ 1 \left[\|\nabla Y(t)\| |h| / \sqrt{v} > 2\kappa/3 \right]$$

okay as goes to zero in the integral.
 and is cts at 0 in a ball
 around 0