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

Note t fixed via inner expectation

$$t^T \frac{Y(0)}{\sqrt{V}}$$

new indicator

NI

bounding it s.t

old indicator OI

continuous

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

wavy

instead of

as not cts could maybe deal with it by

indicator could cause problems as need to bring it into the 2nd integral

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$$\mathbb{1}\left[\|\nabla Y(0)\|\,|h| / \sqrt{V} > \eta/3\right]$$

$$\leq \mathbb{1}\left[\frac{\|\nabla Y(t)\|\,|h|}{\sqrt{V}} > \frac{2\eta}{3}\right]$$

$$\leq \mathbb{1}\left[\|\underbrace{\nabla(Y(t))}_{X}\|\,|h| / \sqrt{V} > 2\eta/3 \quad |h|\|\nabla Y(0) - \nabla Y(t)\| / \sqrt{V} < \eta/3\right]$$

$$+ \mathbb{1}\left[|h| \frac{\|\nabla Y(0) - \nabla Y(t)\|}{\sqrt{V}} > \eta/3\right]$$

Or just use convolution fields!

$$\leq \mathbb{1}\left[\frac{|h| L \|t\|}{\sqrt{V}} > \eta/3\right] \leq \mathbb{1}\left[\frac{|h|^2 L}{V} > \eta/3\right]$$

cts in a neighbourhood of 0 so we're okay!

$$\text{Gone} \int \mathbb{1}\,\mathbb{1}\left[\|X\| > \frac{\eta/3\,\sqrt{V}}{|h|}\right] p(X)\, \delta_\varepsilon(X)\, dX \longrightarrow 0$$

as $\mathbb{1}[\|X\| > \eta/3] = 0$ at $x = 0$