

(2)

$$= \lim_{r \rightarrow 0} \frac{Y(t/\sqrt{r}) - Y(0) - \frac{t^T \nabla Y(0)}{\sqrt{r}} - \frac{1}{2} t^T \frac{\nabla^2 Y(0)}{Y(0)} t}{Y(0)}$$

so $r \rightarrow 0$
 ① num/denom $\neq 0$

$$\lim_{r \rightarrow 0} \mathbb{P} \left(\sup_{t \in B_0(h)} \left| Y(t/\sqrt{r}) - Y(0) - \frac{t^T \nabla Y(0)}{\sqrt{r}} - \frac{1}{2} t^T \frac{\nabla^2 Y(0)}{Y(0)} t \right| > \eta/3, \mathcal{U}(B_r(0)), Y(0) > v \right) \quad (*)$$

$$\mathbb{P}(\mathcal{U}(B_r(0)), Y(0) > v)$$

Lemma On the event $Y(0) > v$, $t/\sqrt{Y(0)} \leq t/\sqrt{v}$.

as such.

$$\sup_{t \in B_0(h) \cap B_r(0)} \left| Y(t/\sqrt{Y(0)}) - Y(0) - \frac{t^T \nabla Y(0)}{Y(0)} - \frac{1}{2} t^T \frac{\nabla^2 Y(0)}{Y(0)} t \right|$$

$$\leq \sup_{t \in B_0(h)} \left| Y(t/\sqrt{v}) - Y(0) - \frac{t^T \nabla Y(0)}{\sqrt{v}} - \frac{1}{2} t^T \frac{\nabla^2 Y(0)}{v} t \right|$$

$$\Rightarrow (*) \leq \mathbb{P} \left(\sup_{t \in B_0(h) \cap B_r(0)} \left| Y(t/\sqrt{v}) - Y(0) - \frac{t^T \nabla Y(0)}{\sqrt{v}} - \frac{1}{2} t^T \frac{\nabla^2 Y(0)}{v} t \right| > \eta/3 \right) \Rightarrow \mathbb{P}(\mathcal{U}(B_r(0)), Y(0) > v.)$$