$$\frac{Y_i - \hat{\mu}}{\hat{\sigma}} \qquad | \; | + | \; |$$

$$|\hat{\mu} - \mu| < \varepsilon \;, \quad |\hat{\sigma} - \sigma| < \varepsilon$$

$$\left\| \frac{Y_i - \hat{\mu}}{\hat{\sigma}} \right\|^{2.} \qquad |a+b| \leq |a| + |b|.$$

$$\left| \frac{\hat{\sigma}}{\sigma} \right|$$

$$\left\| \frac{Y_i - \hat{\mu}}{\hat{\sigma}} \right\| = \left\| \frac{Y_i - \mu}{\hat{\sigma}} + \frac{\mu - \hat{\mu}}{\hat{\sigma}} \right\| \leq \left\| \frac{Y_i - \mu}{\hat{\sigma}} \right\| + \left\| \frac{\mu - \hat{\mu}}{\hat{\sigma}} \right\|$$

$$= \left| \frac{\sigma}{\hat{\sigma}} \right| \left(\left\| \frac{Y_i - \mu}{\sigma} \right\| + \left\| \frac{\mu - \hat{\mu}}{\sigma} \right\| \right) \longrightarrow \text{maybe need } \sigma \text{ bounded below?}$$

$$\leq \frac{(1+\varepsilon)}{} \left(\underbrace{\left\| \frac{Y_i - \mu}{\sigma} \right\|}_{\eta_i} + \varepsilon \right) = X_i$$