$$n^{1/2} \frac{\max (a_n(i) - \bar{a}_n)^2}{\sum_{i=1}^{n} (a_n(i) - \bar{a}_n)^2}$$

when does this converge?: ie group membership

$\uparrow$

$x_{ij} = 0$ or 1

$$= n^{-1/2} \frac{\max (a_n(i) - \bar{a}_n)^2}{\underbrace{\frac{1}{n} \sum_{i=1}^{n} (a_n(i) - \bar{a}_n)^2}_{\text{converges}}}$$

for

So need $\frac{1}{n^{1/2}} \max (a_n(i) - \bar{a}_n)^2 \longrightarrow 0$

Sufficient for an to be bounded.

need $\max |a_n(i) - \bar{a}_n| = o(n^{1/4})$

Sufficient for one of b or a to be bounded

& for the other to have

$\max |a_n(i) - \bar{a}_n| = o(n^{1/2})$!

Q: when does this hold?