Factors that influence the size of confidence intervals

(mean value) $\pm$ (confidence value) $\times$ (Standard Error)

① **Mean value** $\hat{p}$ or $\bar{x}$ (sample mean)

These values change the location of the interval, but not the size.

② **Confidence value**

The higher the confidence, the larger the interval. This is because as confidence grows, $z_{\alpha/2}$ and $t_{\alpha/2, df}$ increase. Confidence increases as interval increases b/c the bigger the interval, the more likely it will contain μ. (note also that n has a slight effect on t via the df. As $n\uparrow$ $t\downarrow$ and thus CI$\downarrow$)

③ **Standard Error**

$(SE)_{\bar{x}}$ i. $\sigma/\sqrt{n}$ as $n\uparrow$ $(SE)_{\bar{x}}$ (and thus CI) $\downarrow$

ii $s/\sqrt{n}$ same, but a little faster, since $s \sim \frac{1}{\sqrt{n-1}}$

iii $\sigma/\sqrt{n}$ as $\sigma\uparrow$ CI $\uparrow$

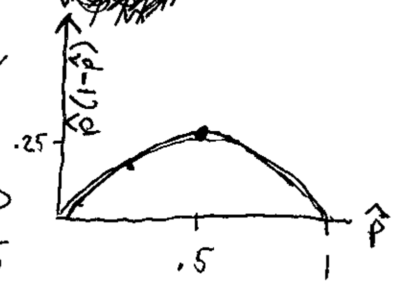
iv $s/\sqrt{n}$ as $s\uparrow$ CI $\uparrow$

$(SE)_{\hat{p}}$ $\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$ i. n: as $n\uparrow$, CI $\downarrow$

ii. $\hat{p}$ also has an effect.

look at the graph $\longrightarrow$

the largest value is at .5



This value is associated with the biggest C.I. As $\hat{p}$ gets smaller or larger from .5, $\hat{p}(1-\hat{p})$ gets smaller, and thus the C.I. gets smaller. This is an interesting fact if you think about it. A 50% chance will give you the least confidence!!