We have learned that a confidence interval for $\pi$ is given by: $\hat{p} \pm z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$.

1. Remind me: What’s the difference between $\hat{p}$ and $\pi$?

2. What’s the midpoint of this interval (in general, not for a specific example)?

3. As the sample size increases (if all else remains the same), what happens to the width of the interval?

4. As the confidence level increases (if all else remains the same), what happens to the width of the interval?

5. Higher confidence is better than lower confidence. So, why don’t we always use 99.99% confidence intervals? What’s the downside of always using 99.99% confidence?