MATH 10B – Spring 2019
Quiz 11 – Prepared by John Yirong Zhen
Date:04/16/2018

You are to finish this quiz in 10 minutes. You are allowed one single-sided letter-size cheat sheet. No calculators or other notes/books/devices are allowed.
Your cheatsheet must be handwritten by you, no photocopying or preprinted (unless you have written permission from the instructor). Try your best! Stay calm and good luck!

I. True/False (2 pts)

Circle T or F in the space provided in front of the statement to indicate whether it is true or false respectively. You get +1 for a correct answer, −1 for incorrect, and 0 for leaving it blank. (You should not guess if you don't know the answer.)
You do not need to justify your answers for T/F statements.

- Ⓣ F $E(s_*^2) \leq \sigma^2$.
  $E(s_*^2) = E(\frac{n-1}{n}s^2) = \frac{n-1}{n}E(s^2) \leq \sigma^2$
- T Ⓕ The smaller the 95% confidence interval is, the lower our confidence is that the true parameter is in that interval.
  We are always 95% confident that the true parameter is in the 95% confidence interval irrespective of the size of the interval.

II. Written problems (10pts)

- You MUST **justify your answer** to undoubtably convince me that you solved and not guessed it. Partial credit will be given to good work and progress even if there is no final answer or the answer is incorrect. On the other hand, bogus justification for a correct answer will receive a 0.
- Keep your scratch work separate. Cross out writing you don't want to be graded and clearly label the parts you want to be graded.
- Points will be deducted for incorrect writings that you "forget to cross out."

See problem on back.

I flip a biased coin 100 times and get 64 heads. What is a 95% confidence interval for p, the probability that a head comes up in a flip? No need to simplify your calculation to a single number. You can just plug in the number without simplifying the expression. For example, if $x = 1.5 + 3.4 + 5.18$, you don't need to simply x to 10.08. You can just use x.

This is a sum of Bernoulli trials. Our best estimate for $\hat{p} = \hat{\mu} = \frac{64}{100}$. Then, $\hat{\sigma} = \sqrt{\hat{p}(1-\hat{p})} = \frac{12}{25}$. Thus, our 95% CI is $\left(\hat{\mu} - 2\frac{\hat{\sigma}}{\sqrt{n}}, \hat{\mu} + 2\frac{\hat{\sigma}}{\sqrt{n}}\right) = \left(0.64 - 2\frac{\frac{12}{25}}{\sqrt{100}}, 0.64 + 2\frac{\frac{12}{25}}{\sqrt{100}}\right) = (0.544, 0.736)$.