

LAST NAME (Print): **KEY**

Statistics 111 **Quiz 14**

1. You want to place a confidence interval (CI) on the median correlation between GPA and SAT scores at different universities. You sample 100 random universities; the sample median is 0.15. You resample 20 times from that sample (with replacement) and the medians of the 20 resamples are:

0.2, 0.19, 0.15, 0.17, 0.16, 0.14, 0.25, 0.2, 0.21, 0.17, 0.18, 0.22, 0.19, 0.2, 0.12, 0.15, 0.19, -0.08, 0.21, 0.23

0.02 Set a 95% one-sided lower CI with the percentile bootstrap.

The 5th percentile of the bootstrap medians is the average of the two smallest values, -0.08 and 0.12, or 0.02.

Set a 90% two-sided CI with the pivot bootstrap. L = **0.06** U = **0.28**

From above, we know the 5th percentile. The 95th percentile is the average of the two largest values, or 0.25 and 0.23, which is 0.24. Then $2 * (0.15) - 0.02$ is U, and $2 * (0.15) - 0.24$ is L.

2. You sample 13 people in a class of 20. The average GPA is 3.1 and the sd is 0.8. Set a two-sided 90% confidence interval on the mean GPA for the class.

L = **2.86** U = **3.34**

A CI with a t -table and a FPCF. The point estimate is 3.1, the standard error is $0.8/\sqrt{13}$, the FPCF is $\sqrt{(20-13)/(20-1)}$, and the value from the t -table with 12 degrees of freedom is 1.782. Putting this together gives 3.1 ± 0.234 .

3. You believe that your probability p of getting a date has a Beta distribution with $\alpha = 2$ and $\beta = 1$. You ask three people for a date, and all accept.

What is your new distribution for p ? **Beta(5,1)**

Beta-Binomial conjugate family. The posterior is $\text{Beta}(\alpha + x, \beta + n - x)$ or $\text{Beta}(5, 1)$.

What is a 90% upper bound on your probability of getting a date? **0.98**

$0.9 = \int_0^b 5x^4 dx = b^5$. Take the fifth root of 0.9 to find the bound is $b = 0.9791$.

4. List all, and only, the true statements. (5 pts) **C, E**
- A.** Holding all else constant, as confidence increases, the width of the interval decreases.
 - B.** Holding all else constant, as σ increases, the width of the interval decreases.
 - C.** Holding all else constant, as n increases, the width of the interval decreases.
 - D.** Holding all else constant, as the FPCF increases, the width of the interval decreases.
 - E.** The pivot bootstrap is better than the percentile bootstrap.