Math 58B, Spring 2023
Jo Hardin
WU # 17
Thursday, March 30, 2023

Your Name: _____

Names of people you worked with: _____

1. What is the best on-campus job?
2. Give one similarity between how we approach inference for proportions and inference for means.
3. Consider an example to assess the mercury content of dolphin muscle. Elevated mercury concentrations are an important problem for both dolphins and other animals, like humans, who occasionally eat them.
   (a) Create a 90% confidence interval for the average mercury content in dolphin muscle from a sample of 19 Risso's dolphins from the Taiji area in Japan using the data below. Measurements are in micrograms of mercury per wet gram of muscle (μg / wet g). Interpret the interval.
   (b) Assuming the data values are reasonably bell-shaped (they probably aren't), create a 90% prediction interval for the mercury content in an individual Risso's dolphin. Interpret the interval.

n	Mean ($\overline{X}$)	SD (s)	Min	Max
19	4.4	2.3	1.7	9.2

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mosaic::xqt(0.95, df = 18)
 1.734064
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Solution:

Let μ be the population average mercury (in μg / wet g) content in dolphin muscle.

3. (a) 90% CI for μ:

$$4.4 \pm 1.734 \cdot 2.3/\sqrt{19} \rightarrow (3.485 \ \mu\text{g / wet g}, 5.315 \ \mu\text{g / wet g})$$

We are 90% confident that the true population average amount of mercury content in Risso's dolphin muscle (from the Taiji area in Japan) is between 3.485 μg / wet g and 5.315 μg / wet g.

3. (b) 90% prediction interval for an individual response:

$$4.4 \pm 1.734 \cdot 2.3 \cdot \sqrt{1 + \frac{1}{19}} \rightarrow (0.308 \ \mu\text{g / wet g}, 8.492 \ \mu\text{g / wet g})$$

There is a 0.9 probability that a randomly selected Risso's dolphin from the Taiji area in Japan will have a muscle mercury content of between 0.308 μg / wet g and 8.492 μg / wet g.