Quiz Bowl 3!!!!!!!

• Rules:
  – 1. Answer quickly and correctly
  – 2. Get cookies
Problem 1

• Practice using $N(0,1)$ tables:
  – Find the number $z^*$ such that the area in the interval $[-z^*, z^*]$ is 0.98
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  - **Answer:** $z^* = 2.325$
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    - Answer: $z^* = 2.325$
  - Find the area to the right of the number $z^* = 1.65$
    - Answer: $z^* = .0495$
Problem 2

• Practice with Confidence Intervals
  – What is the formula for a C-level confidence interval for the mean of a population, when the population standard deviation is known?
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  – Explain in words what a “95% confidence interval for the mean” is.

  – It is an interval that is constructed via a technique that is guaranteed to “catch” the true mean 95% of the time.
Problem 3

• Suppose you take an SRS of 16 orca whales and find that the average weight of these whales is 4000 pounds. Assume that the population standard deviation is 400 pounds. Give a 95% confidence interval for the mean weight of orca whales, and explain in words what this interval represents.
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- Suppose you take an SRS of 16 orca whales and find that the average weight of these whales is 4000 pounds. Assume that the population standard deviation is 400 pounds. Give a 95% confidence interval for the mean weight of orca whales, and explain in words what this interval represents.

\[ 4000 \pm 200 \]

This interval has a 95% chance of containing the true mean weight of the orca population. (Note that the interval either contains the true mean or it doesn’t, but 95% of intervals constructed by this technique will contain the true mean.)
Problem 4

• Suppose you collect some data to test a hypothesis of the form

\[ H_0 : \mu = \mu_0 \]

going against a two sided alternative. The P-value of your test is

\[ P = .0548 \]

– Can you reject the null hypothesis at the 5% level?
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– Suppose you later realize that the alternative should have been one-sided, of the form \( H_a: \mu < \mu_0 \). Assuming your data is consistent with this one-sided alternative, what is your new P-value?
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– \( P = .0274 \)

– What was your z-statistic? \( z = -1.92 \)
Problem 5

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– Suppose that 20% of all statistics students break into hives at the mention of a binomial table. You take an SRS of 100 stats students and let X be the count of students who break into hives. Explain why X is binomially distributed, and give the parameters n and p.
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– Binomial because 1. each trial independent of the others, 2. each trial results in “success” (hives) or “failure” (no hives), 3. the probability of success is the same for each trial, and 4. the number of trials is fixed. Here, $n=100$ and $p = .4$