Chapter 4 Exam Prep Worksheet: Numerical Summaries

Statypus Insight: From Producer to Consumer

On your exams, you will not be asked to write the R code to calculate a standard deviation or generate a boxplot. Instead, you will be handed the raw results and asked to evaluate them. This turns you into a **Critical Consumer**.

Exam Question 1:
You look at real estate ads for houses in Naples, Florida. A vast majority of the houses have prices ranging from $200,000 to $500,000. The few houses on the water, however, have prices up to $15 million. How will the median and mean of this population differ and how do you know?

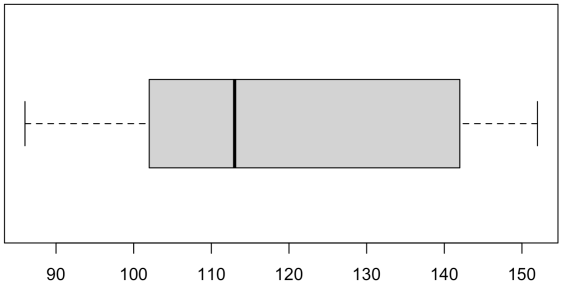
Bill the Statypus says: Notice the Format Whiplash! On the test, you won't have a dataset to plug into R. You have to visualize the distribution in your head. Those waterfront mansions are extreme outliers pulling the tail to the right.

Sally the Statypus says: Don't just say they are different! A proper 'Statypus Standard' answer requires you to use the vocabulary of **resistance**. Explain which value is being chased by the outliers and which one stays closer to the crowd.

Your Turn (Write your answer exactly as you would on the test):

CHAPTER 4

Raw Exam Output:
The box plot below shows the number of calories for different types of poultry hot dogs.



Exam Question 2:
Using the box plot above, estimate the values of the five number summary for this data and write a short sentence for each value explaining its interpretation.

Bill the Statypus says: First, grab your mental ruler. You have to estimate the five key marks: Min, Q_1, Median, Q_3, and Max. Don't stress over being off by a calorie or two—just be consistent.

Sally the Statypus says: Alert! This is a trap if you aren't paying attention to the second half of the prompt. You must interpret *each* value in context. For Q_3, don't just say "75th Percentile" or "Third Quartile." Say: "75% of the poultry hot dogs sampled have [your estimate] calories or fewer."

Your Turn (Estimate and interpret):

Bill the Statypus says: Don't forget to make professional statements about the minimum and maximum. Don't say imprecise things like "biggest" or "most."

Raw Exam Question:
In the Snowy River, the length of adult male platypuses has a mean of 50 cm and a standard deviation of 4 cm. A platypus named "Alpha" is 56 cm long.
In the Eucumbene River, the length of adult male platypuses has a mean of 44 cm and a standard deviation of 3 cm. A platypus named "Beta" is 51 cm long.
While Alpha is obviously longer overall, if we look at them relative to their respective populations, which platypus is longer? Use the numerical summaries to justify your answer in complete sentences and show all work.

Bill the Statypus says: This is a classic "Standardization Check." You can't just look at the raw lengths (56 vs 51) because they come from different environments. You need to use the Standard Deviation to create a **z-score**—the Universal Ruler—to see which one is more unusual.

Sally the Statypus says: Don't just do the math! The exam requires an explanation in complete sentences. After you calculate both z-scores using the formula $z = \frac{x-\mu}{\sigma}$, tell the reader **why** the higher value indicates a relatively longer specimen.

Your Turn (Show your calculations and write your conclusion):

Seneca the Statypus: The Spice of Life

Understanding that data is never just one single point, but a spread of possibilities, is what separates a student who memorizes formulas from a researcher who understands reality. Variation isn't an error in the data, but the **Soul of Statistics.**