Homework 15 Chapter 24 (Problems 1 to 3)

Due on May 2

Math 125 *Kovitz* Spring 2025

1. The speed of light was measured 2,500 times. The average reading was 299,787 kilometers per second, and the SD was 12.5 kilometers per second. Assume the Gauss model, with no bias. Find a 95%-confidence interval for the speed of light.

2. Twenty-five measurements are made on the speed of light. These average out to 300,007 and the SD is 10, the units being kilometers per second. Fill in the blanks in part (a), then say whether each of (b–g) is true or false. Explain your answers briefly. (You may assume the Gauss model, with no bias.)

   (a) The speed of light is estimated as _____; this estimate is likely to be off by _____ or so.

   (b) The average of all 25 measurements is off 300,007 by 2 or so.

   (c) Each measurement is off 300,007 by 10 or so.

   (d) A 95%-confidence interval for the speed of light is $300{,}007 \pm 4$.

   (e) A 95%-confidence interval for the average of the 25 measurements is $300{,}007 \pm 4$.

   (f) About 95% of the readings were in the range $300{,}007 \pm 4$ kilometers per second.

   (g) If a 26th measurement were made, there is a 95% chance that it would by off the exact value for the speed of light by less than 4.

3. True or false and explain: "If the data don't follow the normal curve, you can't use the curve to get confidence levels."