

Module 4B Questions:

1. An ice cream truck owner collects data on the number of sales made each day and the average temperature that day. He computes a regression line for predicting the number of sales based on how far the daily temperature is from freezing (32 degrees Fahrenheit) and finds $\text{sales} = 0.22 + 1.8 (\text{degrees over } 32 \text{ Fahrenheit})$. Identify the "y-intercept".

2. Using your 12-mouse dataset, test the following hypothesis: Can we predict glucose from final weight among Chow-fed mice?

Use the following summary statistics: $\bar{X} = \frac{678}{6} = 113$

$$\text{SSE} = \sum (X_i - \bar{X})^2 = 70$$

$$\text{df}=5$$

3. Researchers measure **Activity** scores for a group of laboratory mice. Activity is scored from 1 to 10, where higher values indicate more movement. A mouse scores **9.8** on its first Activity test — one of the highest scores ever recorded in the colony. One week later, the same mouse is tested again under identical conditions.

This time, its Activity score is **7.9**.

a) Explain why the second Activity score is *less extreme* than the first, even though no biological change occurred in the mouse.

What statistical concept describes this pattern?

b) If a mouse scores extremely **low** on the first test (for example, 1.2), what would you expect on the second test? Why?

c) How does regression toward the mean differ from a true biological improvement or decline?