Module 4A Questions:

1. Researchers are studying several traits in a genetically diverse group of laboratory mice. They are interested in whether different factors (diet, strain, sex, activity level, etc.) are associated with key metabolic outcomes.

   For each of the following research questions, **write an appropriate null hypothesis** (H_0) that could be tested statistically.

   1. Does diet (Chow vs. High-Fat Diet) affect Glucose12 levels in mice?

   2. Is activity level associated with Glucose12?

   3. Is the proportion of hyperglycemic mice the same across diets?

   4. Do male and female mice gain the same amount of weight from Week 0 to Week 12?

   5. Among HFD mice only, is Pparg expression related to Il6?

   6. Does B6 have the same probability of hyperglycemia as CAST?

2. For each scenario below, researchers have calculated a **95% confidence interval** from their data. Your task: **Interpret the confidence interval in context.**
   A. Researchers compared Glucose12 levels between Chow and HFD mice. They found:
   difference in mean Glucose12 (HFD-Chow) = 41 mg/dL with 95% CI [35,47]
   B. Mean Weight12 values were compared between the CAST and BALB strains. The estimated mean difference (CAST − BALB) was: -1.8 with 95% CI[-4.5,0.9]
   C. Among mice on the high-fat diet, the proportion who were hyperglycemic was 0.67. A 95% confidence interval for this proportion is: [0.35,0.90]