Module 3A Questions:

1. **In a one-way ANOVA with 3 groups, a rejection of the null hypothesis implies that:**

   A. The 3-population means are equal to each other
   B. The 3-sample means are equal to each other
   C. Each population mean differs significantly from all other population means
   D. Some subset of population means differs from some other subset of population means
   E. Some subset of sample means differs from some other subset of sample means

2. A research team measures **weight gain** in three diet groups:

- Chow
- Low-fat
- High-fat (HFD)

They want to compare all three groups but are unsure whether to run three pairwise t-tests or a single ANOVA. Conceptually, why is ANOVA the appropriate statistical method here?

A. ANOVA avoids inflating the Type I error rate that would occur if multiple t-tests were run.
B. ANOVA is only used when sample sizes are equal.
C. ANOVA works only when there is no variation within groups.
D. ANOVA gives the same result as three t-tests but is faster to compute.

3. Researchers measure **glucose levels** in mice from **three strains** (B6, BALB/c, CAST) after the same dietary intervention. They run a **one-way ANOVA** to test whether mean glucose differs between the strains. The ANOVA output shows:

- A **large F-ratio**
- A **small p-value**
  What does a *large* F-ratio tell you about how the data are structured?

A. The differences *within* each strain are much larger than the differences *between* strains.
B. The differences between strain means are large relative to the variation within each strain.
C. All strains have nearly identical glucose levels.
D. The sample size is too small to detect differences.