

Module 1A Questions:

1. Which statement(s) is true about p-values?
 - a. p-value is the probability that the null hypothesis is true or false
 - b. p-value reflects the weight of evidence against the null hypothesis
 - c. p-value measures the size of the effect
 - d. if p value is less than or equal to the significance level, then the null hypothesis is not rejected.
2. JAX body weight data for male C57BL/6J at 12 weeks: **$29.3 \text{ g} \pm 2.3 \text{ g (mean} \pm \text{SD)}$** for ~120 males. Treat this as your reference population (“wild-type C57BL/6J males at 12 weeks”). *You engineer a new line with a candidate obesity-related allele (“Allele X”) on a C57BL/6J background and measure body weights at 12 weeks in a sample of $n = 20$ male mice carrying Allele X. $\bar{x} = 30.0 \text{ g}$ and $s = 2.5 \text{ g}$.*
 - *A particular C57BL/6J male at 12 weeks weighs 34.0g. What is his Z-score relative to the reference population?*
 - Does the Allele X line have a significantly higher mean body weight than the reference C57BL/6J population (one-sided test, $\alpha = 0.05$)? Assume the sampling distribution of the mean is approximately normal.
 - *Does this p-value tell you that Allele X caused the weight gain? What other sources of variation could explain this result?*
3. Using the 12-mouse dataset, determine how many standard deviations above the Chow mean is mouse **M1s** glucose (118 mg/dL)? Hint: only use the Chow mice (M1, M2, M5, M6, M9, M10).