

1.
 - a. $p_1 - p_2$ = true difference in proportions of adults like those in the study who would be diagnosed with diabetes (Mediterranean diet - low-fat diet).
 - b. Random: treatments were randomly assigned
10%: not needed since there is no sampling without replacement
Large Counts: $248(0.106) = 26.3 \geq 10$, $248(.894) = 221.7 \geq 10$, $134(0.179) = 24 \geq 10$, $134(0.821) = 110 \geq 10$
2.
 - a. We are 99% confident that the interval from 0.084 to 0.164 captures the true difference in the proportions of all U.S. adults who use TikTok (high school diploma - college graduate).
 - b. Yes, the interval of plausible values for the difference in proportions (high school diploma – college graduate) contains only positive values, so there is convincing statistical evidence that the true proportion of all adults with a high school diploma who use TikTok is greater than the true proportion of all adults with a college degree who use TikTok.

3. a. CLASSIFY:

Type of study: Observational study

Variables: Whether U.S. adults in the South and West meet the recommended daily amounts of physical activity (Categorical)

CHOOSE:

two-sample z -interval for $p_1 - p_2$ at a 95% confidence level

$p_1 - p_2$ = true difference in proportions of all U.S. adults who meet the recommended amounts of physical activity (South – West)

CHECK:

Random: “randomly selected U.S. adults”, the two groups can be viewed as independent samples from their respective regions

10%: $1,183 \leq 0.10$ (all U.S. adults in the South); $1,023 \leq 0.10$ (all U.S. adults in the West)

Large Counts: $1,183(0.220) = 260.3 \geq 10$; $1,183(0.780) = 922.7 \geq 10$; $1,023(0.285) = 291.6 \geq 10$; $1,023(0.715) = 731.4 \geq 10$

CALCULATE:

$$\hat{p}_1 - \hat{p}_2 \pm z^* \sqrt{\frac{\hat{p}_1(1 - \hat{p}_1)}{n_1} + \frac{\hat{p}_2(1 - \hat{p}_2)}{n_2}}$$

$$(0.220 - 0.285) \pm 1.96 \sqrt{\frac{(0.220)(0.780)}{1183} + \frac{(0.285)(0.715)}{1023}}$$

$$(-0.1014, -0.0286)$$

CONCLUDE:

We are 95% confident that the interval from -0.1014 to -0.0286 captures the true difference in the proportions of all U.S. adults who meet the recommended amounts of physical activity (South – West).

- b. Yes, because the 95% confidence interval includes only negative values, there is convincing statistical evidence that the true proportion of U.S. adults in the South meeting the recommended amounts of physical activity is less than the true proportion of U.S. adults in the West meeting the recommended amounts of physical activity.

4. a. Answers may vary. Any margin of error ≥ 0.19 is correct.

- b. This conclusion will never be supported by the confidence interval. The confidence interval must include the point estimate (-0.14) which means that a negative value for $p_1 - p_2$ is always plausible regardless of the margin of error. Thus there is not convincing evidence that $p_1 - p_2 > 0$.
- c. This conclusion will never be supported by the confidence interval. Even if 0 is included in the interval of plausible values, there is never convincing evidence that the parameter is equal to one of the plausible values.
- d. Answers may vary. Any margin of error ≥ 0.14 is correct.

5. C

6. A