

1.
 - a. Because there are two independent samples or two groups from a randomized experiment.
 - b. Because we will be using a t distribution to find the critical value t^* for the interval. We use a t distribution instead of a normal distribution because we don't know the population standard deviations, and therefore must use our sample standard deviations in the calculation.
 - c. Because we are constructing a confidence interval, not performing a hypothesis test.
 - d. Because the parameter that is being estimated is a difference of means, $\mu_1 - \mu_2$.

2.
 - a. Random: the 59 volunteers were randomly assigned ✓ . This allows us to show causation if the results are statistically significant.
10%: not needed because there was no sampling without replacement.
Normal/Large Sample: For the ChatGPT group $30 \geq 30$ central limit theorem. For the control group, the sample distribution shows no strong skewness or outliers ✓ . This allows us to assume the sampling distribution of $\bar{x}_1 - \bar{x}_2$ is approximately normal.
 - b. $df = 28; t^* = 2.048$
 - c. $df = 54.97; t^* = 2.004$
 - d. $(-63.0, 5.6)$ No, because 0 is contained in the confidence interval, it is plausible that there is no difference in the true mean amount of time needed to draft a client memo (ChatGPT – control).
 - e. Wider. The conservative degrees of freedom would have a slightly larger t^* critical value, which would make the margin of error larger and the interval wider.

3. a. CLASSIFY:

Type of study: Observational study

Variables: Rent prices for one-bedroom apartments in New York City (quantitative), rent prices for one-bedroom apartments in Chicago (quantitative)

CHOOSE:

two-sample t -interval for $\mu_1 - \mu_2$ at a 95% confidence level

$\mu_1 - \mu_2$ = true difference in mean rent prices for all one-bedroom apartments available (New York City – Chicago).

CHECK:

Random: Independent random samples of 40 apartments in New York City and 50 apartments in Chicago ✓

10%: $40 \leq 0.10$ (all one-bedroom apartments in New York City) and $50 \leq 0.10$ (all one-bedroom apartments in Chicago) ✓

Normal/Large Sample: $40 \geq 30$ and $50 \geq 30$, central limit theorem ✓

CALCULATE:

$$(\bar{x}_1 - \bar{x}_2) \pm t^* \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$
$$(2,238 - 1,969) \pm 1.994 \sqrt{\frac{567^2}{40} + \frac{433^2}{50}}, df = 71.5$$
$$(53.55, 486.45)$$

CONCLUDE:

We are 95% confident that the interval from \$53.55 to \$486.45 captures the true difference in mean rent prices for all one-bedroom apartments available (New York City – Chicago).

- b. Yes, because all of the plausible values in the confidence interval are positive (does not contain 0), Reese has convincing statistical evidence that the true mean rent prices for one-bedroom apartments is greater in New York City than in Chicago.

4. C

5. B