

1.
 - a. There are two independent samples or two groups from a randomized experiment.
 - b. We use a t distribution to calculate the p -value associated with the test statistic from the sample. 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. We are performing a hypothesis test, not constructing a confidence interval.
 - d. The claim being tested is about a difference of two means.

2.
 - a. Does the average time spent daily on leisure and sports for all adults in households with younger children differ from all adults in households with older children?
 - b. $H_0 : \mu_1 - \mu_2 = 0$, $H_a : \mu_1 - \mu_2 \neq 0$, where $\mu_1 - \mu_2$ is the true difference in the mean number of hours spent daily on leisure and sports for all adults in households where the youngest child is under 6 years old and all adults in households where the youngest child is between 6 and 17 years old (under 6 – between 6 and 17).
 - c. Do adults with a child under the age of 6 spend less time on leisure and sports than adults whose youngest child is between 6 and 17 years old?
 - d. $H_0 : \mu_1 - \mu_2 = 0$, $H_a : \mu_1 - \mu_2 < 0$

3.

Random: independent random samples of workers in the legal sector and the education sector ✓

10%: $41 \leq 0.10$ (all workers in the legal sector) and $76 \leq 0.10$ (all workers in the education sector) ✓

Normal/Large Sample: $41 \geq 30$ and $76 \geq 30$, central limit theorem ✓

4.
 - a. Type of study: Experiment
Variables: Type of treatment (A or B) (categorical), cholesterol level (quantitative)
 - b. Two-sample t -test for $\mu_A - \mu_B$, $\alpha = 0.05$
 - c. $\mu_A - \mu_B$ = true difference in mean cholesterol levels between Treatment A volunteers (traditional statin) and Treatment B volunteers (new drug)
 - d. $H_0 : \mu_A - \mu_B = 0$
 $H_a : \mu_A - \mu_B > 0$
 - e. $\bar{x}_A - \bar{x}_B = 210 - 205 = 5$ mg/dL
 - f. Yes, $\bar{x}_A - \bar{x}_B = 5 > 0$, so the sample data show a lower mean cholesterol level for Treatment B volunteers (the new drug).

5. D

6. B