Identify the HT/CI

CREDIT: The questions on this document were written by Erik Packard, PhD, Associate Professor of Mathematics at Colorado Mesa University.

- For each problem (starting on page 2), match it with the letter for the appropriate HT or CI equation given below.

Confidence Interval:		Hypothesis Test:	
A	$\bar{x} \pm (t_\alpha * s)$	B	$t_{\text{Data}} = \dfrac{\bar{x} - \mu_{\text{H}_\text{o}}}{\dfrac{s}{\sqrt{n}}}$
C	$\bar{x}_{\text{Diff}} \pm (t_\alpha * s_{\text{Diff}})$	D	$t_{\text{Data}} = \dfrac{\bar{x}_{\text{Diff}} - 0}{\dfrac{s_{\text{Diff}}}{\sqrt{n}}}$
E	$(\bar{x}_1 - \bar{x}_2) \pm t_\alpha \sqrt{\dfrac{(s_1)^2}{n_1} + \dfrac{(s_2)^2}{n_2}}$	F	$t_{\text{Data}} = \dfrac{(\bar{x}_1 - \bar{x}_2) - 0}{\sqrt{\dfrac{(s_1)^2}{n_1} + \dfrac{(s_2)^2}{n_2}}}$
G	$\hat{p} \pm z_\alpha \sqrt{\dfrac{\hat{p}\hat{q}}{n}}$	H	$\dfrac{\hat{p} - p_{\text{H}_\text{o}}}{\sqrt{\dfrac{pq}{n}}}$
I	$(\hat{p}_1 - \hat{p}_2) \pm z_\alpha \sqrt{\dfrac{\hat{p}_1\hat{q}_1}{n_1} + \dfrac{\hat{p}_2\hat{q}_2}{n_2}}$	J	$z_{\text{Data}} = \dfrac{(\hat{p}_1 - \hat{p}_2) - 0}{\sqrt{\dfrac{(\hat{p}_{\text{Pool}})(\hat{q}_{\text{Pool}})}{n_1} + \dfrac{(\hat{p}_{\text{Pool}})(\hat{q}_{\text{Pool}})}{n_2}}}$ $\hat{p}_{\text{Pool}} = \dfrac{x_1 + x_2}{n_1 + n_2}$
K	$\dfrac{(\text{df})(s^2)}{(\chi^2)_{\text{Right}}} < \sigma^2 < \dfrac{(\text{df})(s^2)}{(\chi^2)_{\text{Left}}}$	L	$(\chi^2)_{\text{Data}} = \dfrac{(\text{df})(s^2)}{\sigma^2}$
		M	$F_{\text{Data}} = \dfrac{(s_1)^2}{(s_2)^2}$

Hypothesis Test:	
N	$(\chi^2)_{\text{Data}} = \sum \frac{(O-E)^2}{E}$ $\text{df} = n - 1$ $E = np$
O	$(\chi^2)_{\text{Data}} = \sum \frac{(O-E)^2}{E}$ $\text{df} = (r-1)(c-1)$ $E = \frac{(\text{Row Total})(\text{Column Total})}{\text{Grand Total}}$
P	Carry out the process for ANOVA
Q	$t_{\text{Data}} = r\sqrt{\frac{n-2}{1-r^2}}$

Confidence Interval:	
R	$y_0 \pm t_\alpha \sqrt{\frac{\sum y^2 - b\sum y - m\sum xy}{n-2}} \sqrt{1 + \frac{1}{n} + \frac{(x_0 - \bar{x})^2}{\sum x^2 - \frac{(\sum x)^2}{n}}}$
S	$\bar{y} \pm t_\alpha \sqrt{\frac{\sum y^2 - b\sum y - m\sum xy}{n-2}} \sqrt{\frac{1}{n} + \frac{(x_0 - \bar{x})^2}{\sum x^2 - \frac{(\sum x)^2}{n}}}$

2. You want to prove at the 1% significance level that the mean number of hours a person studies for a Chemistry final exam is over 20 hours. You will get a sample of people and ask them how many hours they study.

4. You want to give a 95% CI for the difference in average rainfall per day for Grand Junction and Montrose. You will pick 12 days at random throughout the year and measure the amount of rainfall for Montrose, and then you will pick 12 different days at random throughout the year and measure the amount of rainfall for Grand Junction.

6. You want to prove at the 5% significance level that the percentage of cars at the mall is not 40% Chevy, 30% Ford, and 30% other. You will get a sample of 200 cars in the mall parking lot.

8. You want to prove at the 5% significance level that there is some relationship between a person's political party and their religion. You will get 150 people and ask them about their religion and political party.

10. You want to find a 90% CI for the mean number of hours people study for a Chemistry final exam. You will get a sample of people and ask them how many hours they study.

12. You want to prove at the 5% significance level that less than 20% of people study more than 30 hours for a Chemistry final exam. You will get a sample of people and ask them how many hours they study.

14. You want to give a 95% CI for the average number of rebounds an NBA player will get in all games where they get 22 points. You will pick 20 NBA players and 1 game for each and record their points and rebounds.

16. You want to find a 90% CI for the variance in the number of hours people study for a Chemistry final exam. You will get a sample of people and ask them how many hours they study.

18. You want to give a 95% CI for the difference in average rainfall per day for Grand Junction and Montrose. You will pick 12 days at random throughout the year and measure the amount of rainfall for each city.

20. You want to give a 95% CI for the difference in the percentage of men and women that study more than 30 hours for a Chemistry final exam. You will ask 32 men and 32 women how many hours they studied.

22. You want to give a 95% CI for the number of rebounds an NBA player will get in a game where they get 22 points. You will pick 20 NBA players and 1 game for each and record their points and rebounds.

24. You want to give a 99% CI for the percentage of people that study more than 30 hours for a Chemistry final exam. You will get a sample of people and ask them how many hours they study.

26. You want to show at the 10% significance level that there is some linear relationship between an NBA player's points and rebounds in a game. You will pick 20 NBA players and 1 game for each player, and you will record their points and rebounds.

28. You want to prove at the 5% significance level that there is some difference in the average number of people in a car entering the Colorado National Monument between cars with Colorado plates, Utah plates, Arizona plates, and cars with other state plates. You will get 30 different cars of each type and find out how many people were inside.

30. You want to prove at the 5% significance level that Montrose gets more rainfall on average compared to Grand Junction. You will pick 12 days at random throughout the year and measure the amount of rainfall for each city.

32. You want to prove at the 5% significance level that a higher percentage of women study more than 30 hours for a Chemistry final compared to men. You will ask 32 men and 32 women how many hours they studied.

34. You want to prove at the 5% significance level that Montrose gets more rainfall on average compared to Grand Junction. You will pick 12 days at random throughout the year and measure the amount of rainfall for Montrose, and then you will pick 12 different days at random throughout the year and measure the amount of rainfall for Grand Junction.

36. You want to prove at the 1% significance level that the variance in the number of hours a person studies for a Chemistry final exam is over 5. You will get a sample of people and ask them how many hours they study.

38. You want to prove at the 5% significance level that the variance in the amount of daily rainfall is higher in Montrose than in Grand Junction. You will pick 12 days at random throughout the year and measure the amount of rainfall for Montrose, and then you will pick 12 different days at random throughout the year and measure the amount of rainfall for Grand Junction.