Stat 204
Quiz 3 3/13/18 **Name:** SOLUTIONS

1. Here are some definitions from Chapters 3 and 4. For each definition, fill in the blank(s) with the word(s) being defined.

   (a) Half the width of a confidence interval is its margin of error.

   (b) A standard error is an estimate of the standard deviation of a statistic that is based on the data.

   (c) A parameter value is feasible / plausible if the two–sided p-value for testing that parameter value is larger than the significance level.

   (d) An experiment is a study in which researchers actively assign subjects to treatment groups.

   (e) Two variables are associated if the distribution of one variable differs across the values of the other variable.

   (f) An observational study is a study in which researchers do not intervene in order to attempt to influence responses.

   (g) In a double-blind study, neither the subjects nor the evaluators know to which treatment group each subject belongs.

   (h) Well-designed studies are designed to determine how the response variable depends on the explanatory variable.

   (i) The goal of randomization is to produce groups that are as similar as possible in all respects except for the treatment being studied.

2. Many studies have shown that babies born to women who smoked while pregnant tended to weigh less at birth than babies born to mothers who did not smoke while pregnant.

   (a) What kinds of studies are these?

   observational

   (b) What are the variables and the observational units in these studies?

   variables: weight, smoking status of mother; units: babies

   (c) Can a cause–and–effect conclusion be drawn from these studies? Explain your answer.

   No – these are NOT experiments!

3. A recent study found that, in a sample of 1,771 teenagers, 333 had some level of hearing loss. One reporter summarized the study by asserting that "1 in 5 teens has hearing loss, study says."

(a) Rephrase the reporter's claim as a null hypothesis, and provide the corresponding alternative hypothesis.

$H_0: \pi = \frac{1}{5}$ or $H_0: \pi = 20\%$

$H_a: \pi \neq 20\%$

(b) What is the observed statistic? Provide both its value and its correct notation.

$\hat{p} = \frac{333}{1771} = .188 = 18.8\%$

(c) Use an appropriate applet to determine a p-value.

one proportion applet: simulated p-value = .21 = 21% (for one simulation)

(or theory-based inference)

(d) Use an appropriate applet to compute a 95% confidence interval for the parameter of interest, and explain the interval in plain language.

95% CI: $.1698 \leq \pi \leq .2062$

we're confident that between 17% and 21% of teens have some hearing loss.

(e) Your p-value and confidence interval should be consistent. Based on them, what do you conclude?

cannot reject the null; the reporter's summary seems appropriate

4. For a sample of 43 speciments of Yellowfin tuna, the average mercury level was 0.358 parts per million (ppm) and the standard deviation of mercury level was 0.138 ppm.

(a) What are the variable of interest and the observational units in this study?

variable: mercury level; units: the 43 tuna

(b) Use the appropriate applet to compute a 95% confidence interval for the parameter of interest, and explain the interval in plain language.

95% CI: $.3155 \leq \mu \leq .4005$

we're confident that the average mercury level in Yellowfin tuna is between .3155 ppm & .4005 ppm.