Statistical Reasoning   Review for test

1. A local agency wants to build a playground in an abandoned field. But they must first
    determine if the soil is contaminated. To measure the level of contamination, they divided the
    field into 100 different same-sized areas and randomly chose 25 of them. Then they took
    some soil from each of the chosen areas and found no elevated levels of any toxic substances.
    What type of study is this?

2. Researchers wanted to determine whether social class is related to smoking behavior. The
    conducted telephone interviews with 1,308 Massachusetts adolescents aged 12 to 17, selected
    by dialing at random. They found a statistically significant association between whether the
    adolescents smoked or not and the household income. Adolescents from households with less
    income were more likely to smoke, and this was true across all ages, for both sexes, for all
    races, and for all amounts of disposable income the adolescent had.

    Source: Elpidoforos S. Soteriades and Joseph R. DiFranza. "Parent's Socioeconomic
    Status, Adolescents' Disposable Income, and Adolescents' Smoking Status in Massachusetts,"
    Journal of Public Health, Vol. 93, July 2003, pp. 1155–1160, www.pubmedcentral.nih.gov/articlerender.
   fcgi?artid=1447926)

    a. What type of study is this?

    b. Can you conclude from this study that smoking is caused by an adolescent's social class?
        Can you think of a lurking variable that might be responsible for both?

    c. Can you generalize the results of this study to some larger population? Explain your
        thinking.

    d. Describe exactly what you can conclude from this study.

3. Andrew manages a comic book store and is trying to increase sales. He decides to run an experiment for the next 12 Mondays. He randomly picks 6 of the Mondays on which he will say hello to each person as they enter the store. On the other 6 Mondays, he will say hello to each person and offer them something to drink. For each day, he will determine the percentage of people who make a purchas. The percentage of people who made purchases each day and the treatment received are given below.

Hello Only	Hello and Drink Offer
19%	14%
20%	10%
25%	26%
12%	18%
18%	27%
23%	12%

a. What are the treatments for this experiment?

b. What are the responses for this experiment?

c. Is this a well-designed experiment? Explain.

d. Find the value of *mean hello-mean hello and drink*.

e. Describe how to conduct one run of a randomization test to decide whether the different treatments cause a difference in the percentage of people who make a purchase.

f. The histogram below provides the results of 200 random assignments. The value shown in the histogram is *mean hello-mean hello and drink*.
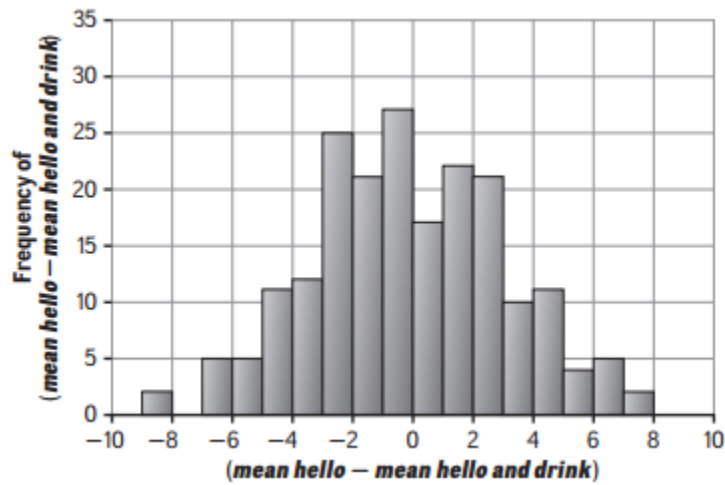
Use the histogram to estimate the probability that if the treatments made no difference, you could get a difference just by random assignment that is at least as extreme as what occurred in the real experiment.

g. Is the difference in the percentage of people making purchases statistically significant?