response: whether or not subject had a heart attack during the study period
explanatory: treatment type

unit: people who recently had a heart attack and were observed during the study period
treatment: placebo and three different doses of vitamin B

4.36 Vitamin B A *New York Times* article (March 12, 2006) described two studies in which subjects who had recently had a heart attack were randomly assigned to one of four treatments: placebo and three different doses of vitamin B. In each study, after years of study, the differences among the proportions having a heart attack were judged to be not statistically significant. Identify the (a) response variable, (b) explanatory variable, (c) experimental units, (d) treatments, and (e) explain what it means to say that differences "were judged to be not statistically significant."

the differences were not large enough to observe the effect was due to sth other than ordinary random variation
if observed difference larger than what would be expected by chance, then is labelled statiscally significant

4.2 High blood pressure and binge drinking Many studies have demonstrated that high blood pressure increases the risk of developing heart disease or having a stroke. It is also safe to say that the health risks associated with binge drinking far outweigh any benefits. A study published in *Heath Magazine* in 2010 suggested that a combination of the two could be a lethal mix. As part of the study that followed 6100 South Korean men aged 55 and over for two decades, men with high blood pressure who binge drank even occasionally had double the risk of dying from a stroke or heart attack when compared to teetotalers with normal blood pressure.

a. Is this an observational or experimental study?
b. Identify the explanatory and response variable(s).
c. Does the study prove that a combination of high blood pressure and binge drinking causes an increased risk of death by heart attack or stroke? Why or why not?

explanatory: whether or not ....
response: whether or not subjects die from stroke/ heart attack

No. Observational study spots association, but not cause and effect

4.44 Student loan debt A researcher wants to compare student loan debt for students who attend four-year public universities with those who attend four-year private universities. She plans to take a random sample of 100 recent graduates of public universities and 100 recent graduates of private universities. Which type of random sampling is utilized in her study design? stratified ranfom sampling

simple: each sample is equally likely
cluster: whole group taken
strata: individual from group

4.48 German mobile study The contingency table shows results from the German study about whether there was an association between mobile phone use and eye cancer (Stang et al., 2001).

refers to studying whether subjects had been smokers in the past

a. The study was retrospective. Explain what this means.

b. Explain what is meant by cases and controls in the headings of the table.

cases- subjects who had eye cancer
control- subjects did not have eye cancer

c. What proportion had used mobile phones, of those in the study who (i) had eye cancer and (ii) did not have eye cancer?

Proportion: used mobile phone / eye cancer = 16/ 118

Eye Cancer and Use of Mobile Phones

Mobile Phones	Cases	Controls
Yes	16	46
No	102	429
Total	**118**	**475**

types of observational studies:
sample survey
retrospective study
prospective study

4.72 Exercise and heart attacks Refer to Exercise 4.71. One potential confounding variable was the amount of exercise the physicians got. The randomization should have balanced the treatment groups on exercise. The contingency table shows the relationship between whether the physician exercised vigorously and the treatments.

	Exercise Vigorously?		
Treatment	**Yes**	**No**	**Total**
Aspirin	7,910	2,997	**10,907**
Placebo	7,861	3,060	**10,921**

a. Find the conditional proportions (recall Section 3.1) in the categories of this potential confounder (amount of exercise) for each treatment group. Are they similar?

exercise/ aspirin= 7910/ 10907

exercise/ placebo = 7861/ 10921

b. Do you think that the randomization process did a good job of achieving balanced treatment groups in terms of this potential confounder? Explain.

yes, the percentages of physicians who exercise vigorously are similar in 2 groups.
he heart attack rate should not be influenced by whether the physicians exercise regularly