How would you analyze the data in the following examples?

1. You wonder whether a new cycling incentive will make people want to ride their bike to work more. You survey a group of Stanford employees about their willingness (on a scale from 1 to 5) to bike to work before the incentives are put into place, and a week after the new incentives are advertised you survey another group of employees.

2. You wonder whether the incentives for biking are even working. You count the number of people present on the Oval in a 10-minute period at 10am one week before the incentives are in place and one week after they are in place. Each time you note how many people are riding their bike.

3. You want to find out the impact of temperature on violence. You obtain, for three consecutive years, daily outside temperature and daily reported violence incidents in New York City.

4. You are told by a law enforcement consultant that violent events are also linked to the street price of crack cocaine. You want to test the link between temperature and violence independently of the price of drug (which you assume is independent from temperature).

5. You want to figure out the relationship between the price and sales of cookies. Specifically, you want to know whether cookies that cost more are sold less. However, when looking at the data, the relationship between these two variables does not appear to be linear.

6. You tested the life satisfaction of four groups: married women, married men, single men and single women. Half of your respondents in each group were asked how satisfied they were; half of your respondents were asked how dissatisfied they were.

7. You wonder how perceptions of parental strictness vary depending on who you ask. You ask 40 teenagers how strict their parents are. You then ask their mothers how strict they are.

8. You think children are more likely to remember words pronounced by their mother than by a stranger because they pay more attention to their mother. You have 2 groups of children in the lab, one hearing words from their mother, another hearing words from a stranger. For each child you record how many words they remember at test, as well as the proportion of time they spend looking at their mother at learning.

9. You are interested in whether there is a relationship between whether a person has had their bikelight stolen and whether they would steal someone else's bikelight. You take ratings of willingness to steal a bikelight on a 7-point scale. The variance of the responses of people who have had their bikelights stolen in the past is much larger than the variance of the responses of people who have not had their bikelights stolen before.

10. A relationship between how cold it is outside and how students score on a test has been shown. You hypothesize that when it is cold, people will stay inside more, so they will study for longer. You believe there is no direct link between temperature outside and the test score. You collect information about the temperature outside when the test was taken, the test score, and how much the person studied.

11. A study was run in which participants judged how much leniency they would show a person who had possibly committed a crime. Participants read about one defendant and saw a picture of this person. In the picture, the defendant was either smiling in one of three ways (false, felt, miserable) or he had a neutral expression. The question of interest is whether there is a relationship between smiling and leniency ratings.

    (a) Assume that the researcher had no hypothesis about which means would differ.

    (b) Suppose the researcher's main hypothesis was that the neutral condition would differ from the other three. The researcher was also interested in whether a miserable smile differed from the other two types of smiles and whether the false and felt smiles differed.

    (c) What if the researcher had the hypotheses of part b, but the method of the study was changed so that each participant saw a picture of all four facial expressions?