14. Evolutionary theories often emphasize that humans have adapted to their physical environment. One such theory hypothesizes that people should spontaneously follow a 24-hour cycle of sleeping and waking—even if they are not exposed to the usual pattern of sunlight. To test this notion, eight paid volunteers were placed (individually) in a room in which there was no light from the outside and no clocks or other indications of time. They could turn the lights on and off as they wished. After a month in the room, each individual tended to develop a steady cycle. Their cycles at the end of the study were as follows: 25, 27, 25, 23, 24, 25, 26, and 25.

18. Twenty students randomly assigned to an experimental group receive an instructional program; 30 in a control group do not. After 6 months, both groups are tested on their knowledge. The experimental group has a mean of 38 on the test (with an estimated population standard deviation of 3); the control group has a mean of 35 (with an estimated population standard deviation of 5). Using the .05 level, what should the experimenter conclude? (a) Use the steps of hypothesis testing, (b) sketch the distributions involved, and (c) explain your answer to someone who is familiar with the *t* test for a single sample but not with the *t* test for independent means.

17. Do students at various universities differ in how sociable they are? Twenty-five students were randomly selected from each of three universities in a region and were asked to report on the amount of time they spent socializing each day with other students. The result for University X was a mean of 5 hours and an estimated population variance of 2 hours; for University Y, *M* =4, S2=1.5; and for University Z,M=6, S2=2.5. What should you conclude? Use the .05 level.

(a) Use the steps of hypothesis testing,

(b) figure the effect size for the study;

(c) explain your answers to parts (a) and (b) to someone who has never had a course in statistics.

11. Make up a scatter diagram with 10 dots for each of the following situations:

(a) perfect positive linear correlation,

(b) large but not perfect positive linear correlation,

(c) small positive linear correlation,

(d) large but not perfect negative linear correlation,

(e) no correlation,

(f) clear curvilinear correlation.

12. (a) Make a scatter diagram of the scores

(b) describe in words the general pattern of correlation, if any;

(c) figure the correlation coefficient;

(d) figure whether the correlation is statistically significant (use the .05 significance level, two-tailed); (e) explain the logic of what you have done, writing as if you are speaking to someone who has never heard of correlation (but who does understand the mean, deviation scores, and hypothesis testing); and (f) give three logically possible directions of causality, indicating for each direction whether it is a reasonable explanation for the correlation in light of the variables involved (and why).