1. Cyrus has the job of quality control for a local grocery chain called Food Giant. His sister Melanie has the same job for a competing chain which is called Mega Mart. Cyrus claims that Food Giant gets better delivery times than Mega Mart on deliveries from Mills Foods on their dry goods products. Cyrus and Melanie each select 45 deliveries from Mills Foods to their respective stores over the past 6 months, and determine the time from order placement to delivery receipt. They want to compare the average delivery times. What test should they use?
2. Ted is a medical researcher, and wants to monitor the blood sugar of some patients in a study. He is concerned that these patients might have a higher blood sugar than the general population. His research tells him that the average adult has a blood glucose level of 84 mg/dL, with a standard deviation of 5.2 mg/dL. What test should Ted use?
3. Sylvia is a medical researcher, and she wants to study the metabolism rates of caffeine in men and women. Sylvia decides to use couples for her comparison and devises a study where both spouses of a couple will eat the same foods, because she believes that diet has a significant effect on metabolism rates. She tries to pick couples where the general health of both spouses are similar. The study requires blood to be drawn after consuming caffeine in similar amounts, adjusted for body mass. She has 37 couples in her study, and wants to determine if the amount of caffeine in the blood is different between men and women. 40 minutes after consuming the caffeine, she takes a blood sample from both the husband and the wife, and measures the caffeine still in the system. What test should Sylvia use?
4. Yuen works for the labor department. He knows that 5 years ago, the average starting salary for someone with a degree in Computer Science was $68,400 per year. He is collecting data using stratified sampling, and has salary data for 42 people who graduated last year. He has calculated the average, and the standard deviation of the recent graduates, and wants to see if the salary has gone up in the last 5 years. Which test should he use?
5. The USDA has commissioned a study to determine the relative yield of two different hybrid soy beans. They have acquired the use of 38 plots of land in 6 different Midwestern states, covering several different types of terrain. Each plot is 20 acres. In each plot, they will use half of the land to plant bean A, and the other half to plant bean B. At the end of the growing season, the beans will be harvested and yield will be measured in lbs. per acre. They want to compare the two yields, to see which bean produces the best. Which test should they use?
6. An auto magazine is doing a price comparison on fuel prices. They have targeted 6 states they want to use for the comparison. From a listing of all gas stations in each of those 6 states, they have randomly chosen between 40 and 50 stations in each state. They want to compare the average price of regular unleaded gasoline across the states. Which test should they use?
7. Pharmaceutical companies routinely use double blind studies to test new drugs. Tribona Pharma has developed a new drug to reduce the incidence of a particular protein compound in the blood stream. For their study, they have contracted with several hundred patients to have the protein levels in their blood measured. Each patient is then either given the new drug, or the commonly prescribed drug that is prominent on the market place. The patients are each randomly assigned to one of the two groups. After 8 months of taking their assigned drug, each patient once again has the protein level in their blood measured, and the decrease in concentration for each patient is calculated. The researchers now want to determine if there is a difference between the two drugs in their ability to reduce the level of the particular protein in the blood stream. Which test should they use?
8. The principal of a high school in Eu Claire, Wisconsin is concerned that a new curriculum for the Biology department is resulting in grade inflation. The new materials were introduced 4 years ago by the school’s 3 life sciences teachers. Principal Bonham has looked through 40 years of grades, and has determined that the historical average score in Biology is 76.9, with a standard deviation of 7.2. She wants to compare the average score for the past 4 years against the historical. What test should she use?
9. Novum Ice Cream has taken three of their most popular flavors of ice cream and sent several containers of each flavor to a local lab. They are looking for an independent evaluation of the fat content for the three brands. Their belief is that the fat content is the same for each flavor. After doing the analysis, the lab sends results back to Novum in a table. Which test should they use?
10. Dr. Telman has been working on a weight control plan that he wants to implement in the clinic where he works. The directors of the clinic are not sure they want to switch to Dr. Telman’s new plan because they are not convinced that it is more effective than what they are already doing. Dr. Telman asks for and is granted the opportunity to test his new method. He randomly selects 18 new patients over the next 4 months from a selected demographic, and puts them on the new plan. 6 months later he has determined that the patients on his plan have lost an average of 4.2 lbs per week. When he looks back through medical records of patients using the old method, he finds that the average weight loss was 4.0 lbs per week. In order to test his new plan, which test should he use?