**1.** Suppose we have two SRSs from two distinct populations and the samples are independent. We measure the same variable for both samples. Suppose both populations of the values of these variables are Normally distributed but the means and standard deviations are unknown. For purposes of comparing the two means, we use

 (a) Two-sample *t* procedures

 (b) Matched pairs *t* procedures

 (c) Two-proportion *z* procedures

 (d) The least-squares regression line

 (e) None of the above. The answer is .

**2.** An SRS of size 100 is taken from a population having proportion 0.8 successes. An independent SRS of size 400 is taken from a population having proportion 0.5 successes. The sampling distribution of the difference in sample proportions has what mean?

1. 0.3
2. 0.15
3. The smaller of 0.8 and 0.5
4. The mean cannot be determined without the sampling results.
5. None of the above. The answer is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**3.** A study was conducted to investigate the effectiveness of a new drug for treating Stage 4 AIDS patients. A group of AIDS patients was randomly divided into two groups. One group received the new drug; the other group received a placebo. The difference in mean subsequent survival (those with drugs – those without drugs) was found to be 1.04 years, and a 95% confidence interval was found to be 1.04 ± 2.37 years. Based upon this information, we can conclude that

 (a) the drug was effective since those taking the drug lived, on average, 1.04 years longer.

 (b) the drug was ineffective since those taking the drug lived, on average, 1.04 years less.

 (c) there is no evidence the drug was effective since the 95% confidence interval covers zero.

 (d) there is evidence the drug was effective since the 95% confidence interval does not cover zero.

 (e) we can make no conclusions since we do not know the sample size or the actual mean survival of each group.

 *The next two questions refer to this scenario.*

Different varieties of fruits and vegetables have different amounts of nutrients. These differences are important when these products are used to make baby food. We wish to compare the carbohydrate content of two varieties of peaches. The data were analyzed with SAS, and the following output was obtained:

 VARIETY N MEAN STD DEV STD ERROR MIN MAX VARIANCES T DF PROB > |T|

 1 5 33.6 3.781 1.691 29.000 38.000 UNEQUAL 2.0110 8.0 0.0791

 2 7 25.0 10.392 3.927 2.000 33.000 EQUAL 1.7490 10.0 0.1109

**4.** We wish to test if the two varieties are significantly different in their mean carbohydrate content. The null and alternative hypotheses are

 (a)

 (b)

 (c)

 (d) 

 (e) 

**5.** The test statistic and *P-*value are

 (a) 1.7490; 0.0318

 (b) 1.7490; 0.0554

 (c) 2.0110; 0.1582

 (d) 2.0110; 0.0791

 (e) 2.0110; 0.0396

6. Two types of tennis balls were tested to determine which one goes faster on a serve. Eight different players served one of each type of ball and the results were recorded.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Server** | **Raphael** | **Roger** | **Serena** | **Venus** | **Andy** | **Justine** | **LLeyton** | **Maria** |
| **Type A** | 120 | 125 | 119 | 110 | 118 | 82 | 115 | 105 |
| **Type B** | 115 | 122 | 114 | 114 | 115 | 91 | 110 | 106 |

Assuming that the speeds are approximately normally distributed, how many degrees of freedom will there be in the appropriate t-test used to determine which type of tennis ball travels faster?

(a) 6 (b) 7 (c) 16 (d) 15 (e) 14

7. Sometimes, the order in which a question is asked makes a difference in how it is answered. For example, if you ask people if they prefer chocolate or strawberry ice cream, you might get different answers than if you asked them if they prefer strawberry or chocolate. Seventy-five randomly selected people were asked, “Do you prefer chocolate or strawberry?” and 75 different randomly selected people were asked, “Do you prefer strawberry or chocolate?” The results are given in the following table.

|  |  |  |
| --- | --- | --- |
|  | **Response:****Prefer Chocolate** | **Response:****Prefer Strawberry** |
| **Question: Do you prefer chocolate or strawberry?** | 42 | 33 |
| **Question: Do you prefer strawberry or chocolate?** | 34 | 41 |

A two-proportion z-test was performed on these data to see if the order of the question made a difference. What is the approximate P-value of the test?

(a) 0.453

(b) 0.093

(c) 0.560

(d) 0.055

(e) 0.191

***The next three questions refer to the following scenario.***

Sixty-eight people from a random sample of 128 residents of Uppsala, Sweden, had blue eyes. 45 people from a random sample of 110 people from Preston, England, had blue eyes. Let  represent the proportion of people in Uppsala with blue eyes, and let  represent the proportion of people in Preston with blue eyes.

8. If researchers suspected that the distribution of eye color is different in these two countries before collecting the data, which of the following pairs of hypotheses would be appropriate to test?

 (a) 

 (b) 

 (c) 

 (d) 

 (e) 

9. Which of the following represents the correct conclusion for the significance test described in Question 8?

 (a) Reject  at the 5% significance level since the *P-*value is 0.06.

 (b) Fail to reject  at the 5% significance level since the *P-*value is 0.06.

 (c) Reject  at the 5% significance level since the 95% confidence interval for  is .

 (d) Reject  at the 1% significance level.

 (e) Fail to reject  at the 10% significance level.

10. Which of conditions (a)–(c) is *not* necessary in order to perform the test in Question 8?

 (a) There must be at least 1280 people in Uppsala, Sweden and at least 1100 people in Preston, England.

 (b) *np* and *n*(1 – *p*) must be large enough for Normal calculations to be reasonably accurate.

 (c) Two independent random samples must be taken.

 (d) None of conditions (a)–(c) is necessary.

 (e) All of conditions (a)–(c) are necessary.

11. Popular wisdom is that eating presweetened cereal tends to increase the number of dental caries (cavities) in children. A sample of children was (with parental consent) entered into a study and followed for several years. Each child was classified as a sweetened-cereal lover or a non-sweetened cereal lover. At the end of the study, the amount of tooth damage was measured. Here are the summary data:

|  |  |  |  |
| --- | --- | --- | --- |
| **Group** | **n** | **Mean** | **Std. Dev.** |
| **Sugar bombed** | 10 | 6.41 | 5.0 |
| **No sugar** | 15 | 5.20 | 15.0 |

 An approximate 95% confidence interval for the difference in the mean tooth damage is

 (a)  (b) 

 (c) (d) 

**F**ree **R**esponse **Q**uestions

12. Just before the presidential election in November 2008, a local newspaper conducted a poll of residents of a medium-sized city and found that 120 out of a simple random sample of 250 men intended to vote for Barack Obama and 132 out of an SRS of 240 women intended to vote for Obama.

(a) Is this convincing evidence that there was a gender difference in Obama’s support in this city? Support your conclusion with a test of significance, using = 0.05.

 (b) Construct and interpret a 95% confidence interval for the difference in proportion of women and men who supported Obama in this city.

13. Jordan’s cat ―Fern‖ is a finicky eater. Jordan is trying to determine which of two brands of canned cat food Fern prefers, Tab-a-Cat or Chow Lion. For two months, she flips a coin each day to decide which of the two foods to feed Fern, and weighs how much Fern eats in grams. Here is the data:

(a) Construct an appropriate significance test at a 0.05 alpha level to determine if there is a significant difference in Fern’s weight based on the brand of cat food Fern is eating.

(b) Construct and interpret a 99% confidence interval for the difference in mean amount of food Fern eats when she is offered Tab-a-Cat and when she is offered Chow Lion.