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For each of the following questions, make sure you set up the null and alternative hypotheses, use both p-value and critical value method, and state your conclusion. If an alpha level is not explicitly mentioned in a problem, you may assume alpha (also called significance level) = 0.05.

1. Many Alpine ski centers base their calculations of revenues and profits on the belief that the average skier ski’s four times a year with a population standard deviation of 2. To investigate this belief a random sample of 63 skiers was drawn and each participant was asked to report the number of times they skied last year. This yielded a mean of 4.84. Can we infer at the 10% significance level that the assumption of ski centers is wrong?

**H0: mu = 4**

**H1: mu ≠ 4**

**This is a two tailed test. The p-value of 0.00145 is less than alpha of 0.10 and the z calculated value of 3.334 is greater than the positive z critical value of 1.645. For both of these reasons we reject the null and infer that at a 10% significance level the assumption that the average skier ski’s four times a year is wrong.**

1. An analyst wants to conduct a hypothesis test to determine if the mean time spent on investment research is different from 3 hours per day. A random sample of 64 portfolio managers yielded a sample mean time to be 2.5 hours. The population standard deviation is 1.5 hours. Conduct the hypothesis test using 1% level of significance and state your findings.

**H0: mu = 3**

**H1: mu ≠ 3**

**This is a two tailed test. The p-value of 0.007661 is less than the alpha value of 0.01 and the z calculated value of -2.667 is less than the negative z critical value of -2.575. For both of these reasons we reject the null and conclude that at a 1% level of significance the mean time spent on investment research is different from 3 hours per day.**

1. The owner of a coffee shop hires a new employee and wants to make sure that all lattes the new employee makes are consistent. He believes that each latte has an average of 4 oz of espresso. If this is not the case, they must increase or decrease the amount. A random sample of 25 lattes shows a mean of 4.6 oz of espresso and a sample standard deviation of .22 oz. Use alpha = .05 and run the appropriate analysis.

**H0: mu = 4**

**H1: mu ≠ 4**

**The is a two tailed test. The p-value of 8.48543E-13 is less than the**

**alpha value of 0.5 and the t calculated value of 13.6364 is greater than the positive t critical value of 0.68. For both of these reasons we reject the null and conclude that at a 5% level of significance the lattes made by the new employee are not consistent.**

1. To see if women ages 18-25 years spend a different amount than the national average of $24.44 per shopping trip to a local mall, the manager surveyed 30 women. She found that the sample average amount spent per trip was $23.37 with a sample standard deviation of $3.70. With alpha = 0.05, can it be concluded that 18-25 years old spend a different amount at the local mall than the national average?

**H0: mu = $24.44**

**H1: mu ≠ $24.44**

**This is a two tailed test. The p-value of 0.124 is greater than the alpha value of 0.05 and the t calculated value is of -1.584 is greater than the negative t critical value of -2.045. For both of these reasons we fail to reject the null and conclude that at a 5% level of significance women aged 18 – 25 years do spend an average of $24.44 per shopping trip at the local mall.**

1. A random sample of 10 college students was drawn from a large university. Their ages are 22, 17, 27, 20, 23, 19, 24, 18, 19, and 24 years. Conduct the appropriate test to determine that the population mean is not equal to 20.

**H0: mu = 20**

**H1: mu ≠ 20**

**This is a two tailed test. The p-value of 0.231 is greater than the alpha**

**value of 0.05 and the t calculated value of 1.285 is less than the positive t critical value of 2.2622. For both of these reasons we fail to reject the null and conclude that at a 5% level of significance the population mean is equal to 20.**

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