1. Given a sample size of 65, with sample mean 726.2 and sample standard deviation 85.3, we perform the following hypothesis test.

*H*0: μ= 750

*H*1: μ< 750

What is the conclusion of the test at the level? Explain your answer 0.10α=

2. Consider the hypothesis test given by :

*H*0: μ = 530

*H*1:μ=≠ 530

In a random sample of 81 subjects, the sample mean is found to be X=524. Also, the population standard deviation is σ= 27

Determine the *P*-value for this test. Is there sufficient evidence to justify the rejection of *H* 0 at the α = 0.01 level? Explain.

3. A certain researcher thinks that the proportion of women who say that the earth is getting warmer is greater than the proportion of men.

In a random sample of 250 women, 70% said that the earth is getting warmer.

In a random sample of 220 men, 68% said that the earth is getting warmer.

At the 0.05 significance level, is there sufficient evidence to support the claim that the proportion of women saying the earth is getting warmer is higher than the proportion of men saying the earth is getting warmer? Show all work and justify your answer.

Refer to the following data for Questions 4 and 5.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| x | 0 | -1 | 1 | 2 | 3 |
| y | 2 | -2 | 5 | 4 | 7 |

4. Is there a linear correlation between x and y at the 0.05 significance level? Justify your answer.

5. Find an equation of the least squares regression line. Show all work; writing the correct equation, without supporting work, will receive no credit.

6. The UMUC Daily News reported that the color distribution for plain M&M’s was: 40% brown, 20% yellow, 20% orange, 10% green, and 10% tan. Each piece of candy in a random sample of 100 plain M&M’s was classified according to color, and the results are listed below. Use a 0.05 significance level to test the claim that the published color distribution is correct. *Show all work and justify your answer.*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Color | Brown | Yellow | Orange | Green | Tan |
| Number | 45 | 13 | 17 | 7 | 18 |

Refer to the following information for Questions 7, 8, and 9.

The IQ scores are normally distributed with a mean of 100 and a standard deviation of 15.

7. What is the probability that a randomly person has an IQ between 85 and 115?

8. Find the 90th percentile of the IQ distribution.

9. If a random sample of 100 people is selected, what is the standard deviation of the sample mean?

There are 1000 students in the senior class at a certain high school. The high school offers two Advanced Placement math / stat classes to seniors only: AP Calculus and AP Statistics. The roster of the Calculus class shows 95 people; the roster of the Statistics class shows 86 people. There are 43 overachieving seniors on both rosters.

10. What is the probability that a randomly selected senior is in exactly one of the two classes (but not both)?

11. If the student is in the Calculus class, what is the probability the student is also in the Statistics class?

A box contains 5 chips. The chips are numbered 1 through 5. Otherwise, the chips are identical. From this box, we draw one chip at random, and record its value. We then put the chip back in the box. We repeat this process two more times, making three draws in all from this box.

12. How many elements are in the sample space of this experiment?

13. What is the probability that the three numbers drawn are all different?

14. What is the probability that the three numbers drawn are all odd numbers?

15. A coin is flipped three times. Let *A* be the event that the outcome of the first flip is a heads. Let *B* be the event that the outcomes of second and third flips are both tails..

**a.** What is the probability that the outcomes of the second and third flips are both tails, given that the first one is a heads? (10 pts)

**b.** Are *A* and *B* independent? Why or why not? (5 pts)

16. A random sample of 225 SAT scores has a mean of 1522. Assume that SAT scores have a population standard deviation of 300. Construct a 95% confidence interval estimate of the mean SAT scores.