1. Two kinds of thread are being compared for strength. Fifty pieces of each type of thread are tested under similar conditions. Brand A had an average tensile strength of 78.3 kilograms with a standard deviation of 5.6 kilograms, while brand B had an average tensile strength of 87.2 kilograms with a standard deviation of 6.3 kilograms. Construct a 95% confidence interval for the difference of the population means.
2. In a batch chemical process, two catalysts are being compared for their effect on the output of the process of reaction. A sample of 12 batches was prepared using catalyst 1 and a sample of 10 batches was obtained using catalyst 2. The 12 batches for which catalyst 1 was used gave an average yield of 85 with a sample standard deviation of 4, and the second sample gave an average of 81 and a sample standard deviation of 5. Find a 90% confidence interval for the difference between the population means, assuming that the populations are approximately normally distributed with equal variances.
3. A manufacturer of compact disk players uses a set of comprehensive tests to access the electrical function of its product. All compact disk players must pass all tests prior to being sold. A random sample of 500 disk players resulted in 15 failing one or more tests. Find a 90% confidence interval for the proportion of compact disk players from the population that pass all tests.
4. Compute a 98% confidence interval for the proportion of defective items in a process when it is found that a sample size of 100 yields 8 defectives.
5. The manufacturer of electric bulbs has established that the average life of the bulbs that his firm produces is 1450 hours with a standard deviation of 150 hours. The production of bulbs is closely monitored so that the bulbs’ lifetimes are maintained close to the average. The manufacturer would not want bulb lifetimes to fall too much below the average as this affects the quality. Neither does he want the lifetime to be much higher as this will reduce sales. Occasionally, he takes a random sample of bulbs to see if the average lifetime of bulbs may have significantly changed (that is, higher or lower than the average). On one particular occasion, he took a sample of 100 bulbs and found the average to be 1390 hours. At 5% level of significance, does the manufacturer have reason to believe that the average lifetime of bulbs manufactured by his company has changed?
6. A sample of 40 teenagers consisting of 14 male and 26 female students are interviewed about their attitude towards the household chore of cooking meals at home for the family. They are simply asked whether they like to perform the chore (positive attitude) or do not (negative attitude). On a 5% level of significance, test to determine if the students’ attitude towards cooking at home is independent of (or does not depend on) gender.

|  |  |  |
| --- | --- | --- |
|  | **Gender** | |
| **Attitude** | **Male** | **Female** |
| **Positive** | 7 | 16 |
| **Negative** | 7 | 10 |

1. An agricultural research institute is studying two new varieties of rice both of which are reputedly high-yielding varieties. There are some studies which suggest that the difference in the yield per hectare may be significant. The head of the institute decides to find out if there is, in fact, a significant difference in yield. Forty hectares are planted to variety A and thirty hectares to variety B. Both varieties are grown under identical laboratory conditions. At harvest time, the results are:

|  |  |  |
| --- | --- | --- |
|  | **Variety A** | **Variety B** |
| **Average yield per hectare,** | 250 | 240 |
| **Standard Deviation,** | 20 | 15 |

At 1% level of significance, is there a significant difference in the yield of two rice varieties?