**Test 1: Z test for mean, population standard deviation is known, single sample**

Problem:

A manufacturer of a certain brand of 9-volt batteries claims that the average life of the battery is 40 hours when used in a radio, with a standard deviation of 5 hours. To test the manufacturer’s claim, a random sample of 100 batteries was tested and it showed an average life of 38 hours. What can you conclude about the manufacturer’s claim at a level of significance α = 0.05? Calculate p – value.

**Test 2: Z test for difference of means, population standard deviations are known, two independent sample**

Problem:

To compare the starting salaries of college graduates majoring in engineering and computer science a random sample of 50 recent college graduates in each major were selected and the following information obtained.

|  |  |  |
| --- | --- | --- |
| Major | Mean ($) | SD($) |
| Engineering | 56,202 | 2225 |
| Computer Science | 50,657 | 2375 |

Do the data provide sufficient evidence to indicate a **difference** in average starting annual salaries for college graduates who majored in engineering and computer science? Test using α = 0.05.

**Test 3: Z test for proportion, single sample case**

Problem:

An e-commerce research company claims that 60% or more graduate students have bought merchandise on-line. A consumer group is suspicious of the claim and thinks that the proportion is lower than 60%. A random sample of 80 graduate students show that only 22 students have ever done so. Is there enough evidence to show that the true proportion is lower than 60%?  Conduct the test at 5 % Type I error rate, and use the p-value and rejection region approaches.

**Test 4: Z test for difference two population proportions, two independent samples**

Problems:

In a study of obesity, the following results were obtained from samples of males and females between the ages of 20 and 35.

|  |  |  |
| --- | --- | --- |
|  | Sample size | Number overweight |
| Males | 150 | 21 |
| Females | 200 | 48 |

Can we conclude from these data that in the sampled population there is a difference in the proportions that are overweight? Let α = 0.05.