**Question No.1**

To validate the claim that there is no significant difference between boys and girls with respect to intelligence, we can conduct a two-sample t-test. This will allow us to compare the means of the two groups while considering the variability within each group. Here's how to do it:

1. **State the Hypotheses**:
   * Null Hypothesis (H0): There is no significant difference between the mean intelligence scores of boys and girls.
   * Alternative Hypothesis (H1): There is a significant difference between the mean intelligence scores of boys and girls.

A 5% Level of Significance (α = 0.05), we'll use this to determine if the difference is statistically significant.

**Calculate the Test Statistic**: We'll use the formula for the two-sample t-test:

Where:

* x1​ and x2​ are the sample means for girls and boys respectively.
* s1 and s2​ are the sample standard deviations for girls and boys respectively.
* n1 and n2 are the sample sizes for girls and boys respectively.

Degrees of Freedom (*df*) = n1+n2−2*n*1​+*n*2​−2

t=70.32+0.675*t*=0.32+0.675​7​

t=70.995*t*=0.995​7​

t=70.9975*t=*0.99757​

t=7.01*t*=**7.01**

Now, we need to find the critical value for a two-tailed test with 5% significance level and Df=50+120−2=168*df*=50+120−2=168. From the t-distribution table or statistical software, this value is approximately **1.976**.

Since 7.01>1.976 , **we reject the null hypothesis**.

Therefore, there is a significant difference between the mean intelligence scores of boys and girls at the 5% level of significance.

**Question No.2**

|  |  |  |  |
| --- | --- | --- | --- |
| Category | Diagnosed as Cancer | Without Cancer | Total |
| Smokers | 220 | 230 | 550 |
| Non- Smokers | 350 | 640 | 990 |
| Total | 680 | 910 | 1590 |

|  |  |  |  |
| --- | --- | --- | --- |
| Category | Diagnosed as Cancer | Without Cancer | Total |
| Smokers | 235.2201258 | 314.7798742 | 550 |
| Non- Smokers | 423.3962264 | 566.6037736 | 990 |
| Total | 658.6163522 | 881.3836478 | 1590 |

Chi-square is 76.31

Degree of freedom is (2-1)\*(2-1)=1

The critical value for a chi-squared test with 1 degree of freedom at a significance level of 5%. From the chi-squared distribution table, this value is approximately **3.841.**

Since 76.31 > 3.841, **we reject the null hypothesis.**

Therefore, we can conclude that there is a significant association between smoking and the diagnosis of cancer. However, remember that association does not imply causation. While this analysis suggests a link between smoking and cancer, further research is needed to establish causality.