|  |  |  |
| --- | --- | --- |
| **Region** | **Expected** | **Actual** |
| Southeast |  |  |
| Defined | 100 | 98 |
| Open | 100 | 104 |
| Northeast |  |  |
| Defined | 150 | 188 |
| Open | 150 | 214 |
| Midwest |  |  |
| Defined | 125 | 120 |
| Open | 125 | 108 |
| Pacific |  |  |
| Defined | 200 | 205 |
| Open | 200 | 278 |

a)

Hypothesis testing is used to explore the relationship between two or more variables in an experimental setting. Business managers use the results of a hypothesis test when making management decisions. Hypothesis testing allows managers to examine causes and effects before making a crucial management decision.

Eg:

1. if a company is considering offering flexible work hours to your employees, they might hypothesize that this policy change will positively affect their productivity.
2. A small business might want to test the cost of acquiring a customer. Hypothesizing this value guides not only on their pricing strategy but also marketing efforts and managing other expenses

b)

Chi Square = ?(Oij – Eij)2/Eij

Where, Oij is the observed value and Eij is the expected value.

Hence,

*Southeast*

Chi Square = (98-100)2/100 + (104-100)2/100 = 0.2

*Northeast*

Chi Square = (188-150)2/150 + (214-150)2/150 = 36.93

*Midwest*

Chi Square = (120-125)2/125 + (108-125)2/125 = 2.512

*Pacific*

Chi Square = (205-200)2/200 + (278-200)2/200 = 30.545

c)

Alpha = 0.05

Assuming there are 2 groups for each region

df = (r-1)\*(c-1) = (2-1)\*(2-1) = 1\*1 = 1

Chi Square Critical = 3.84

*Decision Rule:*

If Chi Square > Chi Square Critical reject the null hypothesis

Hence,

*Southeast*

Since, Chi Square < Chi Square Critical fail to reject the null hypothesis.

*Northeast*

Since, Chi Square > Chi Square Critical reject the null hypothesis in favour of Alternate Hypothesis

*Midwest*

Since, Chi Square < Chi Square Critical fail to reject the null hypothesis.

*Pacific*

Since, Chi Square > Chi Square Critical reject the null hypothesis in favour of Alternate Hypothesis.

d)

The company should also consider doing the correlation test between the two variables to check for association.

e)

chi-square test of independence can be used to verify the influence of gender on purchase decisions. Are men the primary decision makers when it comes to purchasing big ticket items? Is gender a factor in color preference of a car? Here variable X would be gender and variable Y would be color.