**Math Assignment**

*1.The maximum weight that an elevator in an apartment complex can accommodate is 800kg. The average adult weight be about 70 kgs with a variance of 200. What is the probability that the lift safely reaches the ground when there are 10 adults in the lift?*

**Answer**:

Given Mean:70

Varience:200

Hence mean for 10 adults is 10\*70=700

Variance for 10 adults = 10\*200=2000

Therefore, standard deviation(SD) = = 44.72

If the weight >800kg cause the elevator to ‘unsafely’ reach to the ground. than we can find upper tail of our normal distribution:

P(weight of 10 adults > 800kg).

Z-score = = = 2.24

Hence P(Z<2.24),suing z table we get 0.9875 or 98.75%

Hence it is safe to reach the ground when there are 10 adults in the lift

2. The life of a 60- watt light bulb in hours is known to be normally distributed with σ = 25 hours. Create 5 different random samples of 100 bulbs each which has a mean life of x\_bar ~ 1000 hours and perform one-way ANOVA with state it.

Answer:

The total sample size is N=500.N=500. Therefore, the total degrees of freedom are:

df\_{total}=500-1=499

df total =500−1=499

The between-groups degrees of freedom are df\_{between}=5-1=4,

df between =5−1=4,

and the within-groups degrees of freedom are: df\_{within}=df\_{total}-df\_{between}=499-4=495

df within =df total −df between =499−4=495

=499712

= S

S\_{total)==267464.112

SS within =266084.42

SS between =1379.692

MS between = =344.923

MS\_{within}== =537.544

F= =0.642

The following null and alternative hypotheses need to be tested:

H 0 :μ 1 =μ 2 =μ 3 =μ 4 =μ 5

H 1 : Not all means are equal. The above hypotheses will be tested using an F-ratio for a One-Way ANOVA. Based on the information provided, the significance level is \alpha=0.05,α=0.05, and the degrees of freedom df\_2=4,df 2 =4, therefore,

the rejection region for this F-test is R={F:F>F c =2.39}.

Test Statistics F== =0.642

This is concluded that null hypothesis is not rejected. therefore, there is not enough evidence to claim that not all 5-population means are equal at alpha=0.05 significant level

Using p-value approach the p-value is p=0.633

And since p=0.633>=0.05,

it is concluded that null hypothesis is not rejected. therefore, there is not enough evidence to claim that not all 5-population means are equal at alpha=0.05 significant level

3.Fifteen trainees in a technical program are randomly assigned to three different types of instructional approaches, all of which are concerned with developing a specified level of skill in computer-assisted design. The achievement test scores at the conclusion of the instructional unit are reported in Table along with the mean performance score associated with each instructional approach. Use the analysis of variance procedure to test the null hypothesis that the three-sample means were obtained from the same population, using the 5 percent level of significance for the test.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Instrumental method | Test Scores | | | | | Total Score | Mean test score |
| A1 | 86 | 79 | 81 | 70 | 84 | 400 | 80 |
| A2 | 90 | 76 | 88 | 82 | 89 | 425 | 85 |
| A3 | 82 | 68 | 73 | 71 | 81 | 375 | 75 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Anova: Two-Factor Without Replication | | | |  |  |  |
|  |  |  |  |  |  |  |
| *SUMMARY* | *Count* | *Sum* | *Average* | *Variance* |  |  |
| Row 1 | 5 | 400 | 80 | 38.5 |  |  |
| Row 2 | 5 | 425 | 85 | 35 |  |  |
| Row 3 | 5 | 375 | 75 | 38.5 |  |  |
|  |  |  |  |  |  |  |
| Column 1 | 3 | 258 | 86 | 16 |  |  |
| Column 2 | 3 | 223 | 74.33333 | 32.33333 |  |  |
| Column 3 | 3 | 242 | 80.66667 | 56.33333 |  |  |
| Column 4 | 3 | 223 | 74.33333 | 44.33333 |  |  |
| Column 5 | 3 | 254 | 84.66667 | 16.33333 |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| ANOVA |  |  |  |  |  |  |
| *Source of Variation* | *SS* | *df* | *MS* | *F* | *P-value* | *F crit* |
| Rows | 250 | 2 | 125 | 12.39669 | 0.003542 | 4.45897 |
| Columns | 367.3333 | 4 | 91.83333 | 9.107438 | 0.004499 | 3.837853 |
| Error | 80.66667 | 8 | 10.08333 |  |  |  |
|  |  |  |  |  |  |  |
| Total | 698 | 14 |  |  |  |  |

a **large f value** (one that is bigger than the **F** critical **value** found in a table), it means something is significant, while a small **p value** means all your results are significant.

A **low P value(0.00354<0.05)** suggests that your sample provides enough evidence that you can reject the null hypothesis for the entire population