Assignment 2 Solutions

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Welcome, students! Let's tackle **Assignment 2** together, applying the concepts we've learned about the **Mode**, **Mean**, and **Median** from frequency distribution tables. We'll approach each problem step-by-step to ensure clarity and understanding.

1 Problem 1: Finding the Mode and the Mean

1.1 Given Frequency Table

C	35-44	45-54	55-64	65-74	75-85
f	4	10	15	11	4

1.2 Solution

1.2.1 1. Finding the Mode

The **Mode** is the value that appears most frequently in a dataset. For grouped data, the mode lies within the class interval that has the highest frequency.

Steps to Find the Mode:

1. **Identify the Modal Class:**
   - Examine the frequencies to find the highest value.
   - In this table, the highest frequency is **15**, corresponding to the class **55-64**.
2. **Determine the Parameters:**
   - **A** = Lower limit of the modal class = **55**
   - $\mathbf{f_2}$ = Frequency of the modal class = **15**
   - $\mathbf{f_1}$ = Frequency of the class preceding the modal class = **10**
   - **L** = Class interval length = Upper limit - Lower limit + 1
   - For class **55-64**, $L = 64 - 55 + 1 = 10$ (assuming inclusive classes)
3. **Apply the Mode Formula (Formula 2):**

$$\text{Mode} = A + \left(\frac{f_2}{f_1 + f_2}\right) \times L$$

Plugging in the values:

$$\text{Mode} = 55 + \left(\frac{15}{10 + 15}\right) \times 10 = 55 + \left(\frac{15}{25}\right) \times 10 = 55 + 6 = 61$$

Therefore, the Mode is 61.

1.2.2 2. Finding the Mean

The **Mean** is the average value of the dataset, calculated by dividing the sum of all data points by the total number of observations.

Steps to Find the Mean:

1. **Determine the Midpoints (m) for Each Class:**

$$m = \frac{\text{Lower Limit} + \text{Upper Limit}}{2}$$

   - **35-44:** $m = \frac{35+44}{2} = 39.5$
   - **45-54:** $m = \frac{45+54}{2} = 49.5$
   - **55-64:** $m = \frac{55+64}{2} = 59.5$
   - **65-74:** $m = \frac{65+74}{2} = 69.5$
   - **75-85:** $m = \frac{75+85}{2} = 80$
2. **Create an Extended Frequency Table:**

C	f	m	m × f
35-44	4	39.5	158
45-54	10	49.5	495
55-64	15	59.5	892.5
65-74	11	69.5	764.5
75-85	4	80	320
Sum	**44**		**2730**

3. **Apply the Arithmetic Mean Formula (Formula 3):**

$$\bar{X} = \frac{\sum(m \times f)}{\sum f}$$

Plugging in the values:

$$\bar{X} = \frac{2730}{44} \approx 62.05$$

Therefore, the Mean is approximately 62.05.

2 Problem 2: Finding the Median

2.1 Given Frequency Table

C	**40-49**	**50-59**	**60-69**	**70-79**	**80-89**	**90-100**
f	4	8	13	15	7	3

2.2 Solution

2.2.1 1. Finding the Median

The **Median** is the middle value of a dataset, which separates the data into two equal halves. For grouped data, the median is calculated using the class interval that contains the median position.

Steps to Find the Median:

1. **Calculate $\frac{\sum F}{2}$:**

$$\frac{\sum F}{2} = \frac{4+8+13+15+7+3}{2} = \frac{50}{2} = 25$$

2. **Determine the Median Class:**

   - Create a **Cumulative Frequency Table** to identify the class where the cumulative frequency just exceeds 25.

C	**f**	**Upper C**	**F.C.A**
40-49	4	49	4
50-59	8	59	12
60-69	13	69	25
70-79	15	79	40
80-89	7	89	47
90-100	3	100	50

   - The cumulative frequency reaches **25** at the **60-69** class. Since 25 is exactly at the upper limit of the **60-69** class, the median class is **60-69**.

3. **Identify Parameters:**

   - **A** = Lower limit of the median class = **60**
   - $\mathbf{f_1}$ = Cumulative frequency before the median class = **12**
   - $\mathbf{f_2}$ = Cumulative frequency of the median class = **25**
   - **L** = Class interval length = Upper limit - Lower limit + 1
   - For class **60-69**, $L = 69 - 60 + 1 = 10$ (assuming inclusive classes)

4. **Apply the Median Formula (Formula 1):**

$$\text{Median} = A + \left(\frac{\frac{\sum F}{2} - f_1}{f_2 - f_1} \right) \times L$$

   Plugging in the values:

$$\text{Median} = 60 + \left(\frac{25 - 12}{25 - 12} \right) \times 10 = 60 + \left(\frac{13}{13} \right) \times 10 = 60 + 10 = 70$$

Therefore, the Median is 70.

Note: In cases where $\frac{\sum F}{2}$ falls exactly on the upper limit of a class, that class is considered the median class.

3 Summary of Assignment 2

1. **Problem 1:**
    - **Mode:** 61
    - **Mean:** 62.05
2. **Problem 2:**
    - **Median:** 70

4 Conclusion

Great job on completing **Assignment 2**! By meticulously following the steps to identify the **Mode**, **Mean**, and **Median**, you've reinforced your understanding of these fundamental statistical measures. Remember:

- **Mode:**
  - The most frequently occurring value.
- **Mean:**
  - The average value of the dataset.
- **Median:**
  - The middle value that separates the dataset into two equal halves.

Keep practicing with various frequency distribution tables to enhance your proficiency. Until next time, continue exploring the fascinating world of statistics!