

APPLIED STATISTICS (STA304)

MID TERM PRACTICE

INDEX NUMBERS

Multiple Choice Questions:

- Two Suppose that a cup of coffee in a particular café cost Rs. 35 in 2002. In 2012, an identical cup of coffee cost Rs. 50. How has the price changed from 2002 to 2012?

141

139

142----- $\text{change in the value/prices} = (\text{valu}/\text{basevalue}) * 100$

120

- In weighted price index, various items are assigned

No specific weights

Weights

Values

None of them

- In Fisher index number Lespeyres and Paasche's are used as a:

Geometric Mean

Airthematic Mean

Median

Harmonic Mean

- Weighted aggregative price index number and Weighted average of relatives price index are alternative ways of getting:

Same results

Opposite results

All of the above

None of the above

- Weighted average of relatives price indices are computed by multiplying each price relative by its weight, summing these products and dividing by

The sum of the weights

The multiplication of the weights

The difference of the weights

None of the above

TIME SERIES

- In moving average method, we will drop the values from:

Middle

First

Last

First and last

- If a time series has an even number of years and we use coding, then each code interval is equal to:

1 year

2 year

1 month

6 months

- In a straight line equation $Y = c + dX$, d is the:

Y-intercept

Slope

X-intercept

Trend

- Value of d in the trend line $Y = c + dX$ is:

Always negative

Always positive

Always zero

Both negative and positive

- Moving average method is used for measurement of trend when:

Trend is linear

Trend is non linear

Trend is curvilinear

None of them

NUMERICALS

INDEX NUMBERS

Q1: An inquiry into the budgets of the middle class families in a city in England gave the following information.

Expenses on Weights	Food (35%)	Rent (15%)	Clothing (20%)	Fuel (10%)	Misc (20%)
Prices (2011)	150	30	75	25	40
Prices (2012)	145	30	65	23	45

What changes in cost of living figures of 2012 as compared with that of 2011 are seen?

The required calculations for cost of living index number are done below.

Expenses on	Weight	Price relative for 2011	I = Price relative for 2012	I X W
Food	35	100	97	3395
Rent	15	100	100	1500
Clothing	20	100	87	1740
Fuel	10	100	92	920
Misc	20	100	113	2260
Total	100	--	--	9815

$$\begin{aligned}\text{The cost of living index number for 2012} &= \frac{\Sigma(I \times W)}{\Sigma W} \\ &= \frac{9815}{100} = 98.15\end{aligned}$$

As the cost of living index number for 2012 with 2011=100, is less than 100, we therefore conclude that prices in 2012 as compared with the prices in 2011 have fallen down.

Q2: What are the various types of weighted aggregative index number?

Laspeyres' Price Index

Paasche's Price Index

Marshall-Edgeworth Price Index

Fisher's Ideal Index

Q3: Compute the weighted aggregative price index from the following information.

$$\Sigma P_1 q_0 = 326.75, \Sigma P_0 q_0 = 253.75.$$

$$P_{on} = \quad \times 100$$

$$P_{on} = \quad \times 100$$

$$P_{on} = 0.12877 \times 100$$

$$P_{on} = 128.77$$

Q4: Name the list of test which proposed by Irvin Fisher ,for a “good” index number formula.

- Time Reversal Test
- Factor Reversal Test
- Circular Test

Q5: Calculate the CPI by using family budget method.

Items	Units	q ₀	p ₀	p ₁
Wheat	Maund	12	22.3	20
Rice	Kg	14	27.4	24.5
Milk	Ltr	18	17	16
Cloth	Yard	10	25.5	22.6
Fuel	Maund	13	24.6	21.5
Oil	Per Tin	15	15.3	18.6

Solution:

Items	Units	q ₀	p ₀	p ₁	I= p ₁ /p ₀	W=poq ₀	W*I
Wheat	Maund	12	22.3	20	0.896861	267.6	240

Rice	Kg	14	27.4	24.5	0.894161	383.6	343	
Milk	Ltr	18	17	16	0.941176	306	288	
Cloth	Yard	10	25.5	22.6	0.886275	255	226	
		13	24.6	21.5	0.873984	319.8	279.5	
Fuel	Maund		15	15.3	18.6	1.215686	229.5	279
Oil	Per Tin	Total	82	132.1	123.2	5.708143	1761.5	1655.5

$$Po1 = X 100$$

$$P_{01} = 1655.5 / 1761.5 * 100$$

$$P_{01} = 93.9824$$

TIME SERIES

Q1: Compute five year moving average from the following given data.

Year	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Values	1114	1117	1119	126	1137	1140	1142	1145	1150	1155

Year	Values	5 Year Moving Total	5 year moving average
1998	1114		
1999	1117		
2000	1119	5613	1123
2001	1126	5639	1128
2002	1137	5664	1132
2003	1140	5690	1138
2004	1142	5714	1143
2005	1145	5732	1146
2006	1150		
2007	1155		

Q2: What are the various types of weighted aggregative index number?

A 4-year centered moving average

$$a'_1 = \frac{1}{2} \left[\frac{1}{4} (Y_1 + Y_2 + Y_3 + Y_4) + \frac{1}{4} (Y_2 + Y_3 + Y_4 + Y_5) \right]$$

$$a'_1 = \frac{1}{8} [Y_1 + 2Y_2 + 2Y_3 + 2Y_4 + Y_5]$$

That is, a 4-year centered moving average. These averages are plotted on the graph of the original values and the line connecting these points is the moving average trend.

Q3: Compute five year moving average from the following given data.

Years	vales
2000	1314
2001	1456
2002	1298
2003	1126
2004	1365
2005	148
2006	1250
2007	1145
2008	3689
2009	1154

Sol:

vales	5-Year total	Average
1314		
1456		
1298	6559	1311.8
1126	5393	1078.6
1365	5187	1037.4
148	5034	1006.8
1250	7597	1519.4
1145	7386	1477.2
3689		
1154		

Years	vales	3-Year total	Average
2000	1314		
2001	1456	4068	1356
2002	1298	3880	1293.333

2003	1126	3789	1263
2004	1365	2639	879.6667
2005	148	2763	921
2006	1250	2543	847.6667
2007	1145	6084	2028
2008	3689	5988	1996
2009	1154		

Q4: Compute 3 year moving average from the following given data.

Years	vales
2000	1314
2001	1456
2002	1298
2003	1126
2004	1365
2005	148
2006	1250
2007	1145
2008	3689
2009	1154

Q5 Allocate values of X then Find the value of $\sum_{i=1}^n Y_i$ and $\sum_{i=1}^n X_i Y_i$ from the following data

Year	2009	2010	2011	2012	2013	2014	2015
Values	10	20	22	30	32	35	38

Solution:

Year	Values Y	X	XY
2009	10	-3	-30
2010	20	-2	-40
2011	22	-1	-22
2012	30	0	0
2013	32	1	32
2014	35	2	70
2015	38	3	114
Total	$\sum_{i=1}^n Y_i = \mathbf{187}$	$\sum_{i=1}^n X_i$	$\sum_{i=1}^n X_i Y_i = \mathbf{124}$

Q5.

When $Y = a + bX_i$. Find the value of “a” by using the following information:

$\sum_{i=1}^n Y_i = 2000$	$\sum_{i=1}^n X_i = 150$	$n = 10$	$b = -0.35$
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Solution:

$$\sum Y = na + b \sum X_i$$

$$2000 = 10a + (-0.35 \times 150)$$

$$2000 = 10a - 52.5$$

$$2052.5 = 10a$$

$$\frac{2052.5}{10} = a$$

$$205.25 = a$$

$$a = 205.25$$