

ASSIGNMENT 01

Statistics for Business & Economics
Course Code: STA 217

Submitted To

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Answer of Exercise 01:

Table 1: Table for calculating Indexes

Item	2000-2001		2006-2007		p_0q_0	p_tq_0	p_tq_t	p_0q_t
	Price	Quantity	Price	Quantity				
	p_0	q_0	p_t	q_t				
Syringes (dozen)	6.41	2500	7.41	2000	16025	18525	14820	12820
Thermometers	8.81	50	9.21	25	440.5	460.5	230.25	220.25
Advil (bottle)	4.31	250	4.71	250	1077.5	1177.5	1177.5	1077.5
Patient Record Forms (box)	6.81	1500	7.51	900	10215	11265	6759	6129
Computer Paper (box)	12.31	56	13.31	54	689.36	745.36	718.74	664.74
Total	38.65	4356	42.15	3229	28447.4	32173.4	23705.5	20911.5

Formula of Simple Price Index

$$p = \frac{p_t}{p_0} \times 100$$

a. Simple Price Index

Syringes (dozen)	115.6
Thermometers	104.5
Advil (bottle)	109.3
Patient Record Forms (box)	110.3
Computer Paper (box)	108.1

Interpretation:

The largest price increase was for Syringes 15.5%, Patient Record Forms was second with 10.3%, Advil was third with 9.3%, Computer Paper was fourth with 8.1% and Thermometers was the lowest increase with 4.5% from the base year 2000-2001 to the current year 2006-2007.

Formula of Simple Aggregate Price Index

$$p = \frac{\sum p_t}{\sum p_0} \times 100$$

b. Simple Aggregate Index 109.1

Interpretation: The aggregate group of prices had increased 9.1% in 2006-2007 from the base year 2000-2001.

Formula of Paasches' Index

$$p = \frac{\sum p_t q_t}{\sum p_0 q_t} \times 100$$

c. Paasches' Index for Prices

113.4

Interpretation: The price of this group of items has increased 13.4% in 2006-2007 from the base year 2000-2001.

Formula of Laspeyre's Price Index

$$p = \frac{\sum p_t q_0}{\sum p_0 q_0} \times 100$$

d. Laspeyre's Price Index

113.1

Interpretation: The price of this group of items has increased 13.1% in 2006-2007 from the base year 2000-2001.

Formula of Value Index

$$p = \frac{\sum p_t q_t}{\sum p_0 q_0} \times 100$$

e. Value Index

83.3

Interpretation: The price of this group of items has decreased 16.7% in 2006-2007 from the base year 2000-2001.

Formula of Fisher's Ideal Index

$$p = \sqrt{(\text{Laspeyres' Index}) \times (\text{Paasche's Index})}$$

f. Fisher's Ideal Index

113.2

Interpretation: The price of this group of items has increased 13.2% in 2006-2007 from the base year 2000-2001.

Answer of Exercise 02:

a. Table 2: Table for Calculation of Specific Seasonal

Year	Quarter	Sales (\$ 000)	Four-Quarter Total	Four-Quarter Moving Average	Centered Moving Average	Specific Seasonal
2003	Winter	313				
	Spring	191				
			860	215		
	Summer	101			202.875	0.4978435
			763	190.75		
	Fall	255			194	1.314433
			789	197.25		
2004	Winter	216			207.5	1.0409639
			871	217.75		
	Spring	217			214.75	1.0104773
			847	211.75		
	Summer	183			215.625	0.8486957
			878	219.5		
	Fall	231			221	1.0452489
			890	222.5		
2005	Winter	247			223.625	1.1045277
			899	224.75		
	Spring	229			231	0.991342
			949	237.25		
	Summer	192			245.375	0.7824758
			1014	253.5		
	Fall	281			256.25	1.0965854
			1036	259		
2006	Winter	312			247.625	1.2599697
			945	236.25		
	Spring	251			239.5	1.0480167
			971	242.75		
	Summer	101			238.75	0.4230366
			939	234.75		
	Fall	307			237	1.2953586
			957	239.25		
2007	Winter	280			241	1.1618257
			971	242.75		
	Spring	269			241.75	1.1127198
			963	240.75		
	Summer	115				
	Fall	299				

Table 3: Calculation needed for Typical Quarterly Seasonal Indexes

Year	Winter	Spring	Summer	Fall
2003			0.498	1.31443299
2004	1.04096386	1.0104773	0.84869565	1.04524887
2005	1.10452767	0.99134199	0.7824758	1.09658537
2006	1.25996971	1.0480167	0.42303665	1.29535865
2007	1.16182573	1.11271975		
Total	4.567	4.163	2.552	4.752
Mean	1.142	1.041	0.638	1.188
Adjusted	1.139	1.038	0.637	1.185
Index	113.9	103.8	63.7	118.5

4.008 C.F. 0.99791
4.000

Interpretation:

Sales for Fall quarter is 18.5% above the typical quarter and for summer it is 36.3% below the typical quarter. The sales of other two quarter Winter is 13.9% and Spring is 3.8% above the typical quarter.

Table 4: Actual and Depersonalized sales

Year	Quarter	Sales (\$ 000)	Seasonal Index	Deseasonal Sales (Y)	t	tY	t ²
2003	Winter	313	1.139	274.698	1	274.70	1
	Spring	191	1.038	183.926	2	367.85	4
	Summer	101	0.637	158.636	3	475.91	9
	Fall	255	1.185	215.113	4	860.45	16
2004	Winter	216	1.139	189.568	5	947.84	25
	Spring	217	1.038	208.963	6	1253.78	36
	Summer	183	0.637	287.429	7	2012.00	49
	Fall	231	1.185	194.867	8	1558.94	64
2005	Winter	247	1.139	216.774	9	1950.97	81
	Spring	229	1.038	220.518	10	2205.18	100
	Summer	192	0.637	301.565	11	3317.21	121
	Fall	281	1.185	237.046	12	2844.55	144
2006	Winter	312	1.139	273.820	13	3559.66	169
	Spring	251	1.038	241.703	14	3383.85	196
	Summer	101	0.637	158.636	15	2379.53	225
	Fall	307	1.185	258.979	16	4143.67	256
2007	Winter	280	1.139	245.736	17	4177.51	289
	Spring	269	1.038	259.037	18	4662.66	324
	Summer	115	0.637	180.625	19	3431.87	361
	Fall	299	1.185	252.231	20	5044.61	400
Total				4559.87	210	48852.74	2870

$$y' = a + bt$$

$$b = \frac{n \sum ty - (\sum Y)(\sum t)}{n \sum t^2 - (\sum t)^2}$$

$$a = \frac{\sum y}{n} - b \left(\frac{\sum t}{n} \right)$$

$$y' = 212.6124 + 1.4649t$$

Interpretation:

The Slope of the trend line is 1.4649. The value 212.6124 is the intercept of the trend line on Y-axis (for t=0).

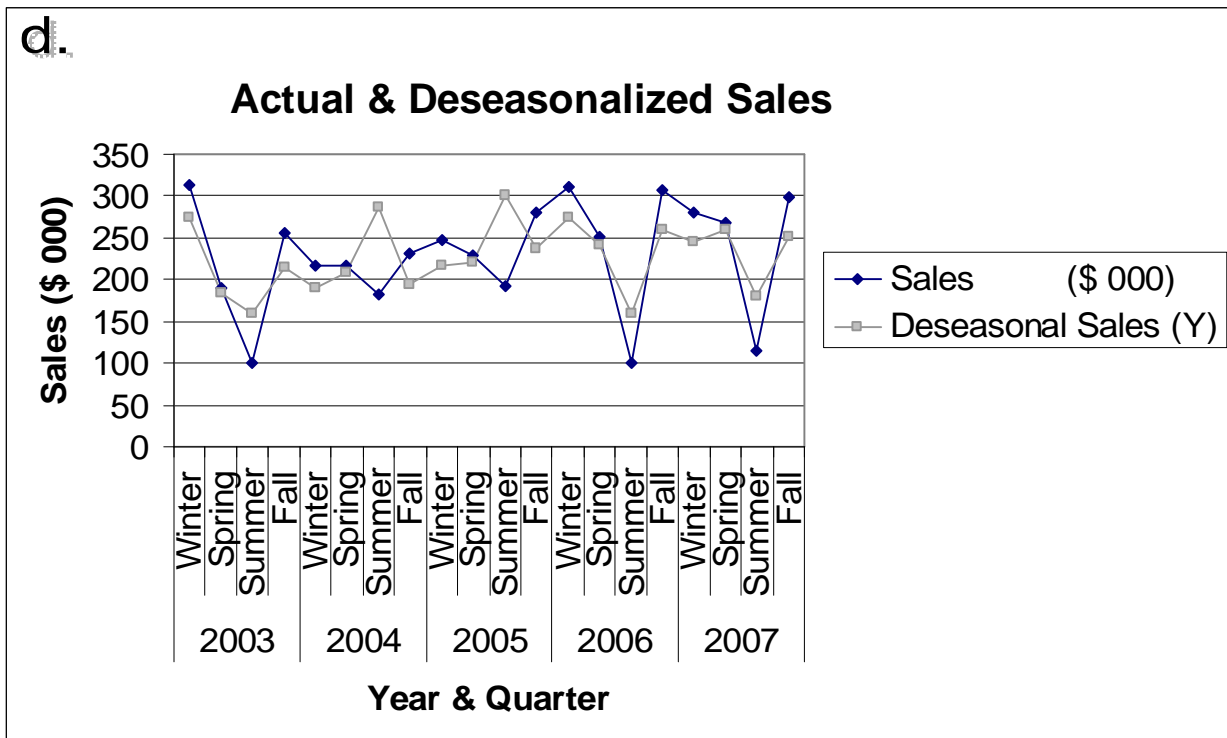
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Table 5: Projected Sales for 2010

Quarter	t	Estimated Sales	Seasonal Index	Quarterly Forecast (\$ 000)
Winter	29	255.095	1.139	290.664
Spring	30	256.559	1.038	266.428
Summer	31	258.024	0.637	164.279
Fall	32	259.489	1.185	307.604

Interpretation:

Sales during the Fall quarter is the highest & least in the Summer & this is consistent with the original data.



Answer of Exercise 03:

Table 6: Calculation for Irregular Trend Equation

Year	Reserve (\$ million) Y	log Y	t	t log Y	t ²
2000-2001	1306.71	3.1162	1	3.1162	1
2001-2002	1582.91	3.1995	2	6.3989	4
2002-2003	2469.61	3.3926	3	10.1779	9
2003-2004	2705.01	3.4322	4	13.7287	16
2004-2005	3023.61	3.4805	5	17.4026	25
2005-2006	3483.81	3.5421	6	21.2523	36
2006-2007	5077.21	3.7056	7	25.9394	49
2007-2008	5514.61	3.7415	8	29.9321	64
Total	25163.48	27.6102	36	127.9481	204

$$\log y' = \log a + \log bt$$

$$\log b = \frac{n \sum t \log y - (\sum \log Y)(\sum t)}{n \sum t^2 - (\sum t)^2}$$

$$\log a = \frac{\sum \log y}{n} - \log b \left(\frac{\sum t}{n} \right)$$

Logarithmic Trend Equation

b 0.08815

a 3.05458

So, the logarithmic trend equation is

$$\log y' = 3.05458 + 0.08815t$$

b.

3.58348, found from the log trend equation $y' = 3.05458 + 0.08815(6)$ by antilog the value we found about 3832.48 (\$ million) international reserve for 2005-2006.

c.

The Anti Log of b 0.02717 is 1.22504. Subtracting 1 yield is 0.22504. International Reserve increased by 22.5% annually.

Answer of Exercise 04:



Table 7: Calculation for Least Square Trend Equation

b.				
Year	Remittances (Y)	t	tY	t²
1990-1991	764.22	1	764.2200	1
1991-1992	849.97	2	1699.9400	4
1992-1993	944.88	3	2834.6400	9
1993-1994	1089.03	4	4356.1200	16
1994-1995	1197.94	5	5989.7000	25
1995-1996	1217.37	6	7304.2200	36
1996-1997	1475.73	7	10330.1100	49
1997-1998	1525.74	8	12205.9200	64
1998-1999	1706.05	9	15354.4500	81
1999-2000	1949.63	10	19496.3000	100
2000-2001	1882.41	11	20706.5100	121
2001-2002	2501.44	12	30017.2800	144
2002-2003	3062.28	13	39809.6400	169
2003-2004	3372.28	14	47211.9200	196
2004-2005	3848.60	15	57729.0000	225
2005-2006	4802.72	16	76843.5200	256
2006-2007	5998.78	17	101979.2600	289
2007-2008	3440.82	18	61934.7600	324
Total	41629.8900	171	516567.5100	2109

$$y' = a + bt$$

$$b = \frac{n \sum ty - (\sum Y)(\sum t)}{n \sum t^2 - (\sum t)^2}$$

$$a = \frac{\sum y}{n} - b \left(\frac{\sum t}{n} \right)$$

Least Square Trend Equation

b	-61.4157
a	249.9145

So, The Least Square Trend Equation is

$$Y' = -61.4157 + 249.9145t$$

c.

The points for the year 1997-1998 is 1937.9 million \$ found from

$Y' = -61.4157 + 249.9145(8)$.

The points for the year 2006-2007 is 4187.131 million \$ found from

$Y' = -61.4157 + 249.9145(17)$.

d.

Estimated wage earners' remittances for 2010-2011 is 5186.789 million \$ found from $Y' = -61.4157 + 249.9145(21)$.