

Assignment #4, Due 2026/05/29

1. The following data show the quarterly sales of a major auto manufacturer for the years 8 through 10.

<i>Year</i>	<i>Quarter</i>	<i>Sales (\$1,000s)</i>
8	1	160
	2	180
	3	190
	4	170
9	1	200
	2	210
	3	260
	4	230
10	1	210
	2	240
	3	290
	4	260

- (a) Compute the four-quarter centered moving average values for the above time series.
- (b) Compute the seasonal indexes for the four quarters.
- (c) Use the seasonal indexes developed in Part b to remove the effect of season from the sales for year 9.
2. The following data show the sales data of 10 individuals before and after attending a preparation seminar.

<i>Subject Before After</i>			<i>Subject Before After</i>		
1	130	160	6	80	82
2	100	105	7	65	55
3	120	140	8	90	105
4	95	90	9	140	152
5	140	130	10	125	140

Use Wilcoxon Signed-Rank test in order to determine whether or not the seminar has been effective. Hint: This is a one tailed test. Let $\alpha = 0.05$.

3. The data of two variables X and Y are given:

	1	2	3	4	5
X (DDT)	65	98	117	122	130
Y (Eggshell)	.52	.53	.49	.49	.37

Compute the Pearson and Spearman rank-correlation and test for their significance. Let $\alpha = 0.05$.

4. Fifteen people were asked to indicate their preference for domestic versus imported cars. The following data showed their preferences.

Individual	Domestic vs. Imported
1	+
2	+
3	-
4	+
5	-
6	-
7	-
8	+
9	+
10	+
11	-
12	+
13	+
14	+
15	-

With $\alpha = 0.06$, test for a significant difference in the preferences for cars. A "+" indicates a preference for imported cars.

5. Below you are given a profit payoff table involving two decision alternatives and three states of nature.

Decision Alternative	<u>States of Nature</u>		
	<i>s1</i>	<i>s2</i>	<i>s3</i>
<i>A</i>	85	45	-20
<i>B</i>	40	50	15

The probability that *s1* will occur is 0.2; the probability that *s2* will occur is 0.6. Calculate the expected values for criteria A and B.

6. Consider a variation of the PDC decision tree shown in the following figure. The company must first decide whether to undertake the market research study. If the market research study is conducted, the outcome will either be favorable (F) or unfavorable (U). Assume there are only two decision alternatives *d1* and *d2* and two states of nature *s1* and *s2*. The payoff table showing profit is shown below.

<u>Decision Alternative</u>	<u>States of Nature</u>	
	<i>s1</i>	<i>s2</i>
<i>d1</i>	100	300
<i>d2</i>	400	200

(a) Show the decision tree.

(b) Use the following probabilities. What is the optimal decision strategy?

$$\begin{array}{llll}
 P(F) = 0.56 & P(s_1 | F) = 0.57 & P(s_1 | U) = 0.18 & P(s_1) = 0.40 \\
 P(U) = 0.44 & P(s_2 | F) = 0.43 & P(s_2 | U) = 0.82 & P(s_2) = 0.60
 \end{array}$$