Test 4 DRAFT Answers

Calc Free Answers

**Question One: [2, 2, 2, 2, 2: 10 marks]**

Which of the following situations involve time series data?

a) Comparing the average price of petrol each day by recording the average price and the day of the week for three consecutive weeks.

 Time series

b) Recording data on the size of the ocean’s tides at 6 hour intervals by recording the level of the tide and the time of day for 5 consecutive days.

 Time series

c) Comparing the fastest running time for each student in the class by recording their fastest time each day for 3 consecutive days.



Not time series

d) Recording the total sales figures for retail store each day by recording the total number of sales and the day of the week over one month.



Time series

e) Recording how much pollution is in the air at the exact same time of day in several different locations.

 Not time series

**Question Two: [5 marks]**

Which of the following graphs depict time series data and for those which do, describe the trend.





Time series. Slightly increasing trend.



Time series. Reducing trend.



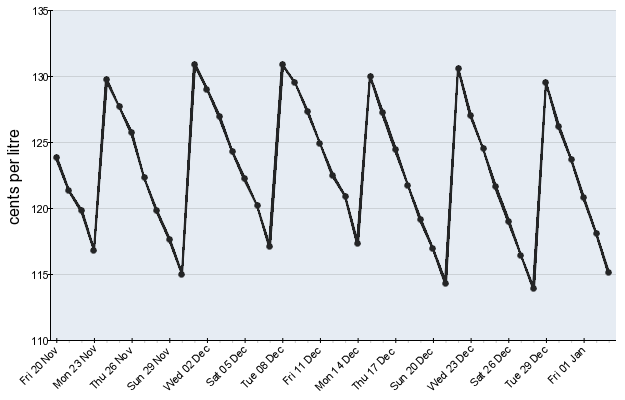


Not time series.

**Question Three: [2, 2, 2, 2: 8 marks]**

State the likely length of the cycle for data shown in the graph and table and for the scenario described below.

a) Daily petrol prices.

 Source: FUELtrac

7 day cycle

b) Number of visitors to a seaside town.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Year  Quarter | 2013  1 | 2013  2 | 2013  3 | 2013  4 | 2014  1 | 2014  2 | 2014  3 | 2014  4 | 2015  1 |
| Visitors (0000’s) | 15 | 25 | 9 | 7 | 13 | 22 | 10 | 8 | 12 |



4 point cycle

c) A company’s sales figures.





A 7 year cycle

d) Attendance at a weekly course.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Week | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Attendance (100s of people) | 10.9 | 11.5 | 11.3 | 11.4 | 6.2 | 12.2 | 11.4 | 11.1 | 12 | 5.9 | 12.4 | 13.1 | 11.3 | 12.9 | 6.3 |

5 week cycle

**Question Four: [2, 2: 4 marks]**

a) Joe Blog wants to buy shares, there are several shares which today cost the same price. Suggest a way in which he might be able to decide which share to buy.

Consider the history of the share process over time to determine if any long term patterns exist and buy the share which shows the highest prediction for future growth.



b) How can collecting prices of properties be analysed as time series data?

Finding the average price of properties in a particular suburb each month over several months.

**Question Six: [2, 2, 6: 10 marks]**

The following data has been provided by the Australian Bureau of statistics and shows the total number of employed persons in Australia in the 1000s. The data was collected monthly and is shown in the table below.

|  |  |
| --- | --- |
| Month-Year | Total number of employed persons in Australia 000’s |
| Jan-2013 | 11301.0 |
| Feb-2013 | 11420.1 |
| Mar-2013 | 11431.5 |
| Apr-2013 | 11475.4 |
| May-2013 | 11485.4 |
| Jun-2013 | 11485.8 |
| Jul-2013 | 11473.8 |
| Aug-2013 | 11355.6 |
| Sep-2013 | 11533.0 |
| Oct-2013 | 11476.5 |
| Nov-2013 | 11439.8 |
| Dec-2013 | 11531.2 |
| Jan-2014 | 11316.8 |
| Feb-2014 | 11457.5 |
| Mar-2014 | 11528.4 |
| Apr-2014 | 11548.0 |
| May-2014 | 11547.6 |
| Jun-2014 | 11548.6 |
| Jul-2014 | 11535.6 |
| Aug-2014 | 11566.6 |
| Sep-2014 | 11535.8 |
| Oct-2014 | 11542.4 |
| Nov-2014 | 11572.7 |
| Dec-2014 | 11703.6 |
| Jan-2015 | 11454.5 |
| Feb-2015 | 11710.2 |
| Mar-2015 | 11684.6 |
| Apr-2015 | 11694.3 |
| May-2015 | 11764.2 |
| Jun-2015 | 11735.1 |
| Jul-2015 | 11743.8 |
| Aug-2015 | 11686.3 |
| Sep-2015 | 11756.9 |
| Oct-2015 | 11849.5 |
| Nov-2015 | 11919.1 |
| Dec-2015 | 12007.5 |

a) What are two ways in which this data may have been collected?

Asking business’s to report their number of employees.

A national census. (Only one answer necessary, other answers will exist)

b) List two reasons why collecting this data might be useful?

To analyse the overall well-being of the nation, to budget for welfare payments (other answers will exist).

The first 24 data points and the last data point have been graphed below.

c) Graph the last 11 data points and describe the overall trend for employment in Australia over the past three years.

Generally increasing trend.



Calc Ass Answers

**Question One: [3, 2, 2, 2, 2, 2: 13 marks]**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Year/Quarter | Company Earnings ($ 000’s) | 4 Point Centred Moving Average | Average for the Year | Company Earnings as a percentage of Yearly average |
| 2012 – 1 | 38 |  | **B 45.25** |  |
| 2012 – 2 | 45 |  | **C 99.45%** |
| 2012 – 3 | 20 | **A 44.8** |  |
| 2012 – 4 | 78 | 44.25 |  |
| 2013 – 1 | 34.4 | 43.75 | 43 | 80% |
| 2013 – 2 | 43 |  | 100% |
| 2013 – 3 | 18 |  | 41.86% |
| 2013 – 4 | **D** 76 | 41.625 | 176.74% |
| 2014 – 1 | 31 **E** |  | 40.25 |  |
| 2014 – 2 | 40 | 40.375 |  |
| 2014 – 3 |  | 40.125 |  |
| 2014 – 4 |  | 39.75 |  |
| 2015 – 1 | 30 | 39.625 | 38.5 |  |
| 2015 – 2 | 38 | 39.125 |  |
| 2015 – 3 | 16 |  |  |
| 2015 – 4 | 70 **F** |  |  |

**Question Two: [2, 2, 3, 3, 4, 2, 3, 3: 22 marks]**

A street market has recently opened. It is open 3 days a week. Attendance is recorded and tracked for the first three weeks of the market opening.

|  |  |  |  |
| --- | --- | --- | --- |
| **Week/Day** | **Attendance (000’s)** | **Weekly Mean** | **Attendance Percentage of Mean** |
| **Week 1 / 1** | 12 |  | 144% |
| **Week 1 / 2** | 8 | 96% |
| **Week 1 / 3** | 5 | 60% |
| **2 / 1** | 9 |  | 117.39% |
| **2 / 2** | 8 | 104.35% |
| **2 / 3** | 6 | 78.26% |
| **3 / 1** | 9 |  | 108% |
| **3 / 2** | 9 | 108% |
| **3 / 3** | 7 | 84% |

The seasonal index for Day 2’s is 102.78%. The seasonal index for Day 3’s is 74.09%.

a) Explain what these figures mean.

For this street market the attendance on day 2’s is 2.78% above the average and the day 3’s tend to see their attendance dropped by 25.91% of the average.

b) Calculate the seasonal index for Day 1’s.



c) Complete the following table of the deseasonalised data for attendance at the street market.

|  |  |
| --- | --- |
| **Week/Day** | **Deasonalised Attendance (000’s)** |
| **1 /1** | 9.75 |
| **1 / 2** | 7.78 |
| **1 / 3** | 6.75 |
| **2 / 1** | 7.31 |
| **2 / 2** | 7.78 |
| **2/ 3** | 8.10 |
| **3 / 1** | 7.31 |
| **3 / 2** | 8.76 |
| **3 / 3** | 9.45 |

d) Complete the following graph for the deseasonalised data.









e) State the rule for the least squares regression line for the deseasonalised data and add this line to the scatterplot of the deseasonalised attendance.





Line

f) Compare the scatterplot for the deseasonalised data to that of the actual data shown below and comment on the effect of deasonalising the data.

Deasonalising the data smooths out the peaks and bumps and allows us to see certain key features of this data such as the fact that day 1 week 1 appears to be high even once deasonalised. Perhaps this was because it was opening night of the street market and they had a special event for the opening.



g) Calculate the deseasonalised attendance figure for each day in the fourth week.

|  |  |
| --- | --- |
| **Week/Day** | **Deasonalised Attendance (000’s)** |
| 4/1 | 8.4138 |
| 4/2 | 8.4746 |
| 4/3 | 8.5354 |

f) Using deseasonalised attendance prediction, estimate the actual attendance for the fourth week.

**Question Three: [2, 2, 3: 7 marks]**

The following table shows the seasonal indices for the weekly sales figures for a particular company.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Day** | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday |
| **Seasonal Index** | 98% | 80% | 79% |  | 102% | 141% | 70% |

a) Calculate the seasonal index for Thursday.



The actual sales figure for Friday is $25 300.

b) Calculate the deasonalised sale figure for Friday.



The least squares regression line for predicting the deseasonalised sale figure for this week of sales is given by, where day 1 is Monday, day 2 is Tuesday etc and sales are in thousands of dollars.

c) Calculate the actual sales figure for Sunday.

