VCE General Mathematics Unit 3

Area of Study 1 sample application task: Data analysis
The Stock Exchange

The application task is to be of 4–6 hours’ duration over a period of 1–2 weeks.

Introduction

Various [stock exchanges](http://money.visualcapitalist.com/all-of-the-worlds-stock-exchanges-by-size/) from around the world are well known and provide important data that informs economic analysis. Various global events impact on the value of stock market indexes. In this task, the behaviour of the stock exchange in Australia, the US and Hong Kong and their association is investigated.

A measure of the Australian Stock Exchange is the ASX100. See data for the [last calendar month](https://www.wsj.com/market-data/quotes/index/AU/XJO/historical-prices).

A measure of the US Stock Exchange is the Dow Jones Index. See data [for the last calendar month](https://www.wsj.com/market-data/quotes/index/GDOW/historical-prices).

A measure of the Hong Kong Stock Exchange is the Hang Sen Index. See data [for the last calendar month](https://www.wsj.com/market-data/quotes/index/HK/HSI/historical-prices).

Component 1

1. Construct a time series plot of the ASX100 over the last calendar month and describe any fluctuations.
2. Using an appropirate smoothing method, smooth the data and describe the smoothed plot.

Component 2

1. Investigate the relationship between the ASX100 and the Dow Jones for a calendar month.
	1. Construct a scatterplot of the ASX100 against the Dow Jones, and describe it in terms of direction, form and strength.
	2. Determine the correlation and coefficient of determination, and interpret these measures.
	3. Determine the equation of the regression line, draw the regression line on the scatterplot, and interpret the intercept and slope in terms of the ASX and the Dow Jones.
	4. Use your model to predict the ASX100 from the Dow Jones for the first trading day of the following month. Comment on your prediction.
2. Investigate the relationship between the ASX100 and the Hang Sen for a calendar month.
	1. Draw a scatterplot of the ASX100 against the Hang Sen, and describe it in terms of direction, form and strength.
	2. Determine the correlation and coefficient of determination, and interpret these measures.
	3. Determine the equation of the regression line, draw the regression line on the scatterplot, and interpret the intercept and slope in terms of the ASX and the Hang Sen.
	4. Use your model to predict the ASX100 from the Hang Sen for the first trading day of the following month. Comment on your prediction.
3. Which of these measures, the Dow or the Hang Sen, would you expect to be on average a better predictor of the ASX100? Give reasons for your choice.

Component 3

Would the model be improved if it was adjusted to reflect the time difference between Australia and the US?

1. Make an appropriate adjustment to the ASX100 data to reflect this time difference.
2. Construct a scatterplot of the adjusted ASX100 against the Dow Jones, and describe it in terms of direction, form and strength.
3. Determine the correlation and coefficient of determination, and interpret these measures.
4. Has adjusting the data improved the model?

Areas of study

The following content from the areas of study is addressed through this task.

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| **Unit 3** |
| **Area of study** | **Topics** | **Content dot points** |
| Data analysis, probability and statistics | Investigating associations between two variablesInvestigating and modelling linear associationsInvestigating and modelling time series data | 4, 5, 61, 2, 3, 4, 5, 6, 7, 81, 2, 3 |

Outcomes

The following outcomes, key knowledge and key skills are addressed through this task.

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| **Unit 3** |
| **Outcome** | **Key knowledge dot point** | **Key skills dot point** |
| 1 | 1, 2, 4, 7, 8, 9, 10, 11, 13 | 2, 3, 7, 8, 9, 10, 11, 12, 13, 14, 18 |
| 2 | 1, 2, 3, 4 | 1, 4 |
| 3 | 1, 3, 4, 5, 6 | 1, 3, 4, 5, 6, 7, 9, 10, 11, 12 |