All Souls St Gabriels School

Year 10 Advanced Mathematics Semester 2 Assignment

TASK IDENTIFIER	STUDENT NAME	TEACHER NAME
2.1	**Ngarita Chappell**	Miss Marley
TOPICS	**GENRE**	**SITTING DATES:**
Data	Report	Issued: **8-8-14** Draft Due: **18-8-14** Final Due: **25-8-14**

TASK CONDITIONS

TIME ALLOWED: 3 weeks (Two weeks in Class)

INSTRUCTIONS TO STUDENTS:

1. You must adhere to All Souls St Gabriel's Assessment Policy.
2. Any submitted work is to be typed
3. Show full working and/or reasoning/justification at all times.
4. Present your work neatly and use correct grammar, punctuation and spelling.
5. Use of a calculator is permitted.
6. Grades will be awarded according to the marking criteria grids
7. Your name must be on the front of this paper and on all separate pages of work submitted.

CCE's

Recalling/remembering, Graphing, Calculating with or without calculators, Substituting in formulae, Extrapolating, Sketching/drawing, Structuring/organising a mathematical argument, Setting out/presenting/arranging/displaying, Applying strategies to trial and test ideas and procedures, Applying a progression of steps to achieve the required answer

RESULTS

U&F		PS&R	

TEACHER COMMENTS

Introduction

The *Department of Agriculture, Fisheries and Forestry* aims to enhance the sustainability, profitability and competitiveness of Australia's agriculture, food, fisheries and forestry industries. Under the DAFF, the *Cotton Research and Development Cooperation* began operation. The CRDC invests in a coordinated research and development programme that creates and promotes the adoption of innovation to increase productivity, competitiveness and environmental sustainability that benefits the Australian cotton industry and wider community. The CRDC is accountable to the Australian people through the Australian Government and also to the cotton industry through its legislated representative industry organisation, Cotton Australia Limited. The CRDC have a wealth of statistical information about Australia's cotton industry and how we compare with other international countries. (Extracts from Table 47,48 and 54) http://data.daff.gov.au/data/warehouse/agcstd9abcc002/agcstd9abcc0022013/ACS2013_Cotton_Tables_v1.0.0.xls

PART A

For **each column in both the tables** below of data use ***excel*** formula to calculate:

- the five number summaries for each set of data.
- the range and inter-quartile ranges for each set of data
- the mean for each set of data

Attach a print out of the excel worksheet showing the formula, use CTRL ~ to display formula

Table 1: Volume of World Exports of Raw Cotton, by Country

	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13
	kt	kt	kt	kt	kt	kt	kt	kt
Africa	1 495	1 249	1 024	778	886	882	983	1 278
Mali	223	185	109	71	96	98	136	191
Americas	4 416	3 209	3 528	3 551	3 097	3 693	3 782	3 900
Australia	650	487	266	260	395	505	994	1 306
Greece	294	272	283	174	191	163	218	261
Uzbekistan	1 045	980	915	653	827	577	544	697
Other	1 641	1 792	2 371	1 098	2 263	1 819	3 367	2 533

Table 2: Australian Cotton Harvested, Lint Yield and Production

	Area Harvested			Lint Yield			Cottonseed Production		
	NSW	QLD	AUSTRALIA	NSW	QLD	AUSTRALIA	NSW	QLD	AUSTRALIA
	'000 ha	'000 ha	'000 ha	t/ha	t/ha	t/ha	kt	kt	kt
1990–91	202	77	279	1.678	1.403	1.602	526.0	160.0	686.0
1991–92	225	87	312	1.812	1.688	1.777	563.0	186.0	749.0
1992–93	204	82	286	1.478	1.314	1.431	365.1	162.4	527.5
1993–94	210	84	294	1.301	1.123	1.25	334.2	131.3	465.5
1994–95	157	89	246	1.594	1.402	1.524	286.5	187.1	473.6
1995–96	185.5	118.4	303.9	1.46	1.27	1.386	382.4	212.4	594.8
1996–97	277	119.1	396.1	1.599	1.403	1.54	627.5	232.6	860.1
1997–98	299.3	138.8	438.2	1.588	1.371	1.519	672.3	269.0	941.3
1998–99	381.7	179.9	561.5	1.243	1.341	1.274	677.5	346.9	1 024.4
1999–2000	313	151.3	464.3	1.574	1.638	1.595	695.7	350.4	1 046.2
2000–01	327.9	199.4	527.3	1.627	1.432	1.553	740.5	399.5	1 140.0
2001–02	289.7	119.3	409	1.771	1.594	1.719	777.1	276.4	1 053.5
2002–03	165.2	59.3	224.5	1.83	1.43	1.724	425.3	120.5	545.8
2003–04	97.2	100.8	198.1	1.849	1.68	1.763	254.2	239.6	493.7
2004–05	162.8	158.1	320.9	2.136	1.881	2.011	491.8	420.5	912.3
2005–06	214.3	121.2	335.5	1.883	1.597	1.779	570.6	273.8	844.4
2006–07	108.7	34.9	143.6	2.223	1.71	2.099	311.1	76.7	387.8
2007–08	41.2	21.4	62.7	2.252	1.864	2.12	131.3	56.5	187.8
2008–09	88	76	164	2.024	1.987	2.007	252.0	213.6	465.5
2009–10	123.8	84.5	208.3	2.067	1.549	1.857	361.9	185.1	547.0
2010–11	347.7	242.5	590.2	1.689	1.396	1.569			1 269.4

							805.2	464.2	
2011–12	358.1	241.1	600	2.057	1.907	1.996	1 041.5	650.2	1 693.5
2012–13	283.5	158.5	442	2.335	2.146	2.267	935.9	481.0	1 416.9

PART B

You are to write a report based the cotton industry. Looking at the data you have been given you are to come up with a hypothesis. You must then use data and graphical comparisons to show whether this hypothesis should be accepted or rejected.

1. **Introduction**

Give some background information. Where did you get the data from? Write about the history of the cotton industry in Australia.

2. **Aim**

What is the aim of this investigation?

3. **Hypothesis**

Make a prediction that can either be proved or disproved.

4. **Method**

Give a detailed method of how you obtained and collated your chosen data, so that someone else could follow if this report was to be done again.

5. **Results**

Include all results found. This will include Excel spreadsheets, graphical displays, statistical analysis and written observations. Clearly indicate the purpose of each display with brief descriptions.

6. **Analysis**

Summarise the aim and the basic results.

How do these results relate to the background information?

Discuss in detail and trends – all statements need to be supported with data analysis and graphical displays.

Discuss any possible sources of error i.e. what mistakes could have been made?

How could this investigation be further extended?

How could it be improved?

Write a conclusion about the effectiveness of your investigation, how easy it was to collate and present the data and the usefulness of the information collected

7. **Conclusion**

Begin with "It can be concluded that....."

"This was determined by..." or "This may be due to..."

Finish by either accepting/supporting or rejecting/refuting the initial hypothesis.

8. **Bibliography**

List of references in alphabetical order.

PART C

Make a poster either by hand or electronically to sum up your findings. Be prepared to present this to the class.

PART A

Table 1: Volume of World Exports of Raw Cotton, by Country Statistical Analysis

Column1	Mean	Median	Mode	Min	Max	Range	Lower Quartile	Upper Qurtile	IQR
Africa	1071.875	1003.5	#N/A	778	1495	717	885	1256.25	371.25
Mali	138.625	122.5	#N/A	71	223	152	97.5	186.5	89
Americas	3647	3622	#N/A	3097	4416	1319	3448.25	3811.5	363.25
Australia	607.875	496	#N/A	260	1306	1046	362.75	736	373.25
Greece	232	239.5	#N/A	163	294	131	186.75	274.75	88
Uzbekista	779.75	762	#N/A	544	1045	501	634	931.25	297.25
Other	2110.5	2041	#N/A	1098	3367	2269	1754.25	2411.5	657.25

Column1	Mean	Median	Mode	Min
Africa	=AVERAGE(B3:I3)	=MEDIAN(B3:I3)	=MODE(B3:I3)	=MIN(B3:I3)
Mali	=AVERAGE(B4:I4)	=MEDIAN(B4:I4)	=MODE(B4:I4)	=MIN(B4:I4)
Americas	=AVERAGE(B5:I5)	=MEDIAN(B5:I5)	=MODE(B5:I5)	=MIN(B5:I5)
Australia	=AVERAGE(B6:I6)	=MEDIAN(B6:I6)	=MODE(B6:I6)	=MIN(B6:I6)
Greece	=AVERAGE(B7:I7)	=MEDIAN(B7:I7)	=MODE(B7:I7)	=MIN(B7:I7)
Uzbekista	=AVERAGE(B8:I8)	=MEDIAN(B8:I8)	=MODE(B8:I8)	=MIN(B8:I8)
Other	=AVERAGE(B9:I9)	=MEDIAN(B9:I9)	=MODE(B9:I9)	=MIN(B9:I9)

Max	Range	Lower Quartile	Upper Qurtile	IQR
=MAX(B3:I3)	=P3-O3	=QUARTILE(B3:I3,1)	=QUARTILE(B3:I3,3)	=S3-R3
=MAX(B4:I4)	=P4-O4	=QUARTILE(B4:I4,1)	=QUARTILE(B4:I4,3)	=S4-R4
=MAX(B5:I5)	=P5-O5	=QUARTILE(B5:I5,1)	=QUARTILE(B5:I5,3)	=S5-R5
=MAX(B6:I6)	=P6-O6	=QUARTILE(B6:I6,1)	=QUARTILE(B6:I6,3)	=S6-R6
=MAX(B7:I7)	=P7-O7	=QUARTILE(B7:I7,1)	=QUARTILE(B7:I7,3)	=S7-R7
=MAX(B8:I8)	=P8-O8	=QUARTILE(B8:I8,1)	=QUARTILE(B8:I8,3)	=S8-R8
=MAX(B9:I9)	=P9-O9	=QUARTILE(B9:I9,1)	=QUARTILE(B9:I9,3)	=S9-R9

Table 2: Australian Cotton Harvested, Lint Yield and Production

Area Harvested	Mean	Median	Mode	Min	Max	Range	Lower Quartile	Upper Quartile	IQR
NSW	220.1130435	210	#N/A	41.2	381.7	340.5	159.9	294.5	134.6
QLD	119.2826087	118.4	#N/A	21.4	242.5	221.1	83	154.7	71.7
AUSTRALIA	339.4391304	312	#N/A	62.7	600	537.3	235.25	440.1	204.85

Area Harvested	Mean	Median	Mode	Min
NSW	=AVERAGE(B15:B37)	=MEDIAN(B15:B37)	=MODE(B15:B37)	=MIN(B15:B37)
QLD	=AVERAGE(C15:C37)	=MEDIAN(C15:C37)	=MODE(C15:C37)	=MIN(C15:C37)
AUSTRALIA	=AVERAGE(D15:D37)	=MEDIAN(D15:D37)	=MODE(D15:D37)	=MIN(D15:D37)

Max	Range	Lower Quartile	Upper Quartile	IQR
=MAX(B15:B37)	=G40-F40	=QUARTILE(B15:B37,1)	=QUARTILE(B15:B37,3)	=J40-I40
=MAX(C15:C37)	=G41-F41	=QUARTILE(C15:C37,1)	=QUARTILE(C15:C37,3)	=J41-I41
=MAX(D15:D37)	=G42-F42	=QUARTILE(D15:D37,1)	=QUARTILE(D15:D37,3)	=J42-I42

Lint Yield	Mean	Median	Mode	Min	Max	Range	Lower Quartile	Upper Quartile	IQR
NSW	1.785652174	1.771	#N/A	1.243	2.335	1.092	1.591	2.0405	0.4495
QLD	1.570695652	1.549	1.403	1.123	2.146	1.023	1.399	1.699	0.3
AUSTRALIA	1.711391304	1.719	#N/A	1.25	2.267	1.017	1.532	1.9265	0.3945

Lint Yield	Mean	Median	Mode	Min
NSW	=AVERAGE(E15:E37)	=MEDIAN(E15:E37)	=MODE(E15:E37)	=MIN(E15:E37)
QLD	=AVERAGE(F15:F37)	=MEDIAN(F15:F37)	=MODE(F15:F37)	=MIN(F15:F37)
AUSTRALIA	=AVERAGE(G15:G37)	=MEDIAN(G15:G37)	=MODE(G15:G37)	=MIN(G15:G37)

Max	Range	Lower Quartile	Upper Quartile	IQR
=MAX(E15:E37)	=G46-F46	=QUARTILE(E15:E37,1)	=QUARTILE(E15:E37,3)	=J46-I46
=MAX(F15:F37)	=G47-F47	=QUARTILE(F15:F37,1)	=QUARTILE(F15:F37,3)	=J47-I47
=MAX(G15:G37)	=G48-F48	=QUARTILE(G15:G37,1)	=QUARTILE(G15:G37,3)	=J48-I48

Production	Mean	Median	Mode	Min	Max	Range	Lower Quartile	Upper Quartile	IQR
NSW	531.6782609	526	#N/A	131.3	1041.5	910.2	348.05	686.6	338.55
QLD	265.0304348	232.6	#N/A	56.5	650.2	593.7	173.75	348.65	174.9
AUSTRALIA	796.7826087	749	465.5	187.8	1693.5	1505.7	510.6	1035.3	524.7

Production	Mean	Median	Mode	Min
NSW	=AVERAGE(H15:H37)	=MEDIAN(H15:H37)	=MODE(H15:H37)	=MIN(H15:H37)
QLD	=AVERAGE(I15:I37)	=MEDIAN(I15:I37)	=MODE(I15:I37)	=MIN(I15:I37)
AUSTRALIA	=AVERAGE(J15:J37)	=MEDIAN(J15:J37)	=MODE(J15:J37)	=MIN(J15:J37)

Max	Range	Lower Quartile	Upper Quartile	IQR
=MAX(H15:H37)	=G51-F51	=QUARTILE(H15:H37,1)	=QUARTILE(H15:H37,3)	=J51-I51
=MAX(I15:I37)	=G52-F52	=QUARTILE(I15:I37,1)	=QUARTILE(I15:I37,3)	=J52-I52
=MAX(J15:J37)	=G53-F53	=QUARTILE(J15:J37,1)	=QUARTILE(J15:J37,3)	=J53-I53

PART B

Australia first exported cotton in 1830, which only consisted of three bags. Now Australia is the second largest cotton exporter worldwide exporting 2.9 million crops on average per year. This is exported to mainly Asian countries, some being: China, Indonesia, Thailand, Korea and Japan. Along with cattle, cotton is one of Australia's main agricultural industries, which spreads from Emerald, NQ all the way to Griffith in NSW.

AIM:

To investigate Australian's cotton export, harvest, lint yield and production using a statistical analysis.

HYPOTHESIS:

Since 2005 Australia's cotton export has increased while the export in other countries has decreased.

METHOD:

1). Gather the data needed from Cotton Australia using the link:
http://data.daff.gov.au/data/warehouse/agcstd9abcc002/agcstd9abcc0022013/ACS2013_Cotton_Tables_v1.0.0.xls

2). Perform a statistical analysis on both sets of data, using mean, median, mode, min, max, range, lower quartile, upper quartile and interquartile range; this can be done by using *Excel*.

Mean: $\underline{\times} = \frac{\sum x}{n}$

Median: $m = \frac{n+1}{2}$

Mode: *most frequent/highest frequency*

Range: $r = max - min$

This will help to put the data into appropriate graphs.

3). After making the data into graphs, analyse the data to find the similarities and differences. Look for common trends in the data and what is noticeable.

4). Using the data, graphs, analysis and results that has been found, prove or disprove the chosen hypothesis.

5). Explain why this is using the evidence found in the investigation.

RESULTS:

Australian Cotton Export 2005-2013

Column1	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Exports	650	487	266	260	395	505	994	1306

FIGURE 1.1

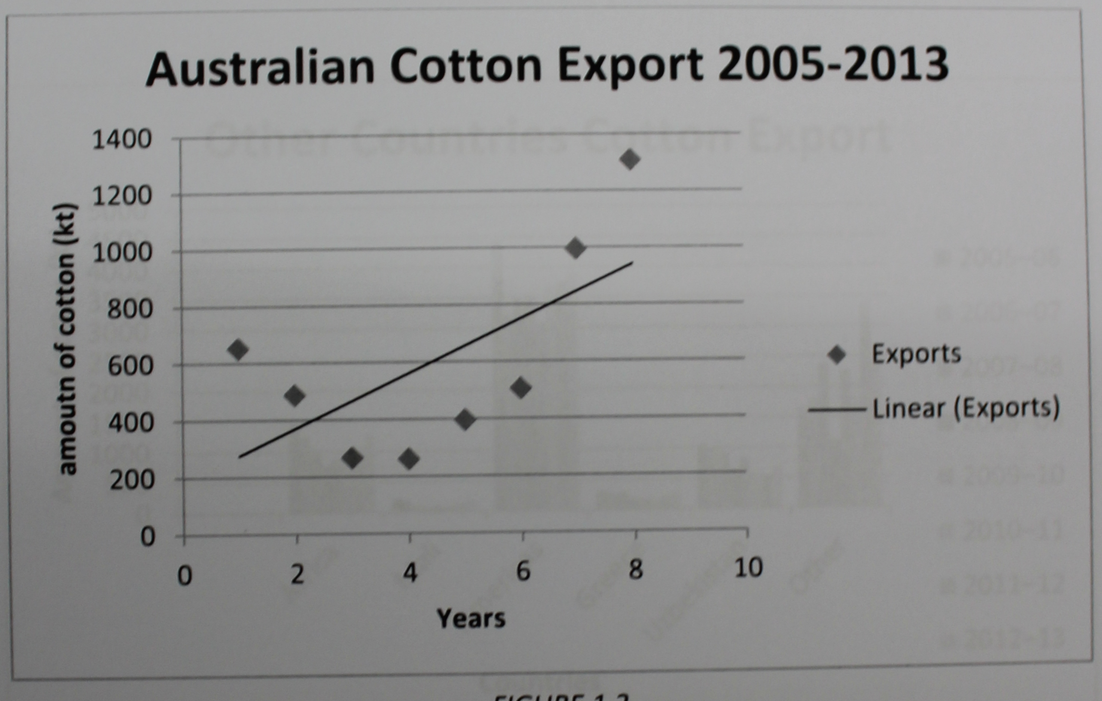


FIGURE 1.2

Figure 1.1 and *1.2* display the statistics for Australia's cotton export from 2005-2013. In Figure *1.2* the data has a positive correlation; this shows that as one variable increases so does the other. This graph also represents a weak correlation, showing that the statistics do not follow a liner pattern. The range in the statistics is a large one with a difference of 1046 (*found in PART A)*; this also shows that there was a significant increase in export.

Other Countries Cotton Export 2005-2013

Other Countries	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13
	kt	kt	kt	kt	kt	kt	kt	kt
Africa	1495	1249	1024	778	886	882	983	1278
Mali	223	185	109	71	96	98	136	191
Americas	4416	3209	3528	3551	3097	3693	3782	3900
Greece	294	272	283	174	191	163	218	261
Uzbekistan	1045	980	915	653	827	577	544	697
Other	1641	1792	2371	1098	2263	1819	3367	2533

FIGURE 2.1

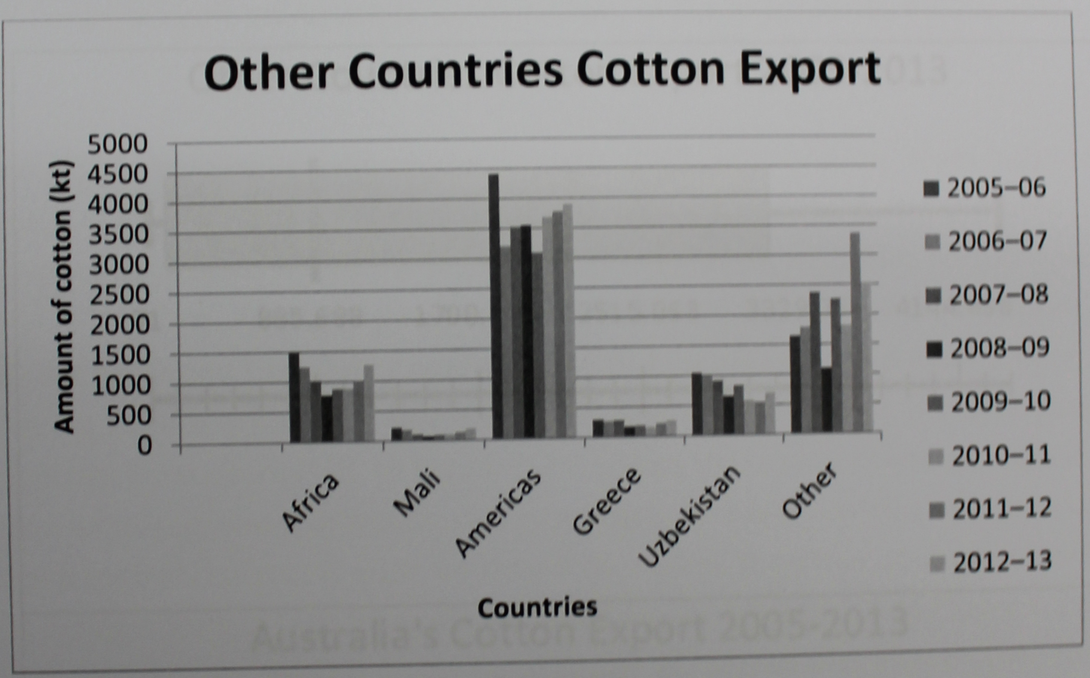


FIGURE 2.2

Figure 2.1 and 2.2 display the statistics for cotton exported from countries other than Australia from 2005-2013. The data shows that America has been a big competitor in the cotton export market. It also shows that countries such as: Mali, Greece and Uzbekistan have decreased in cotton trade.

Australia's Export Compared to Other Countries 2005-2013

FIGURE 3.1

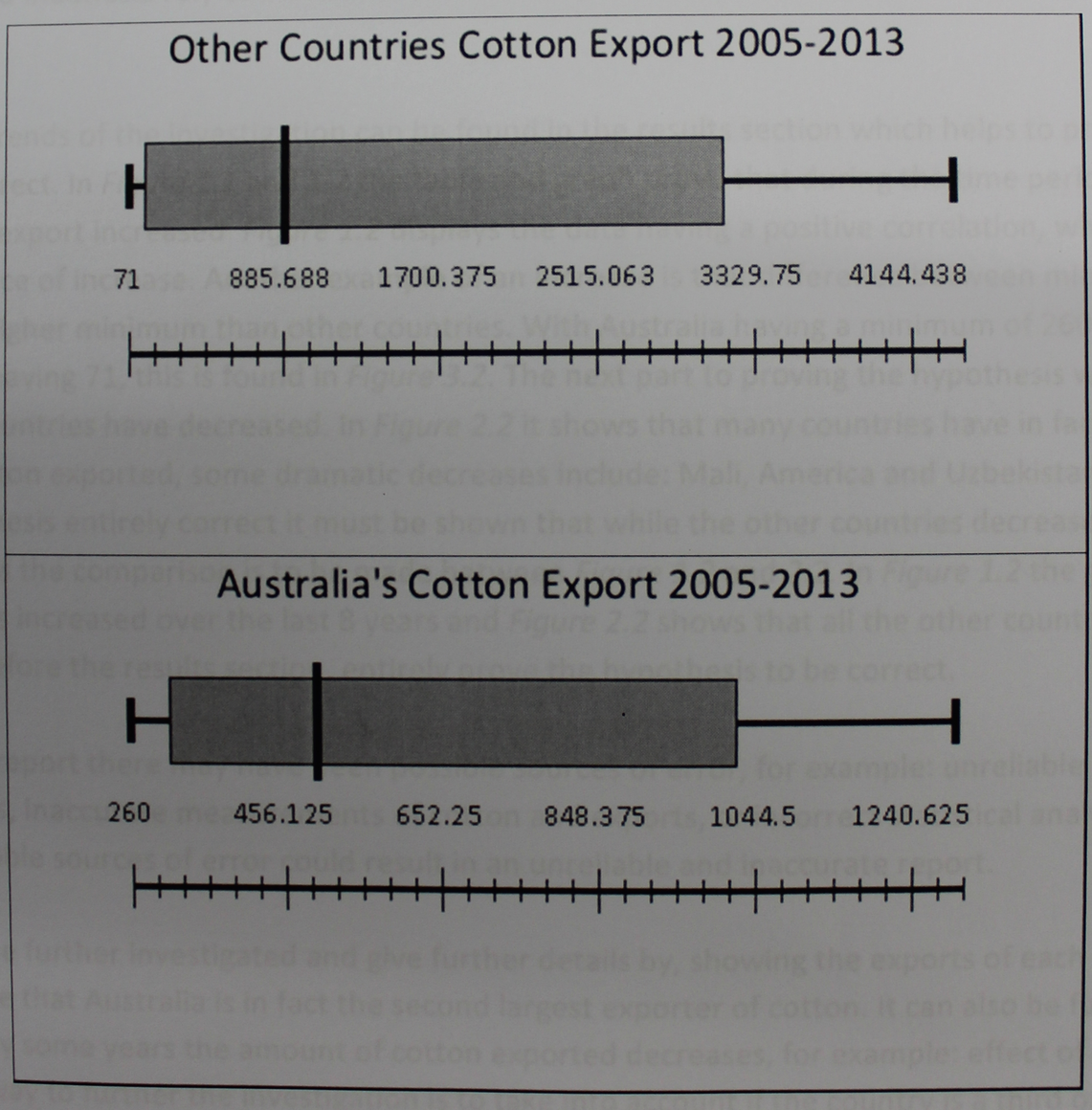


FIGURE 3.2

ng the data from *Figures 3.1 and 3.2* Australia's cotton export can be compared to other countries of the world. *Figure 3.2* displays the statistics as box plots, where it is shown that Australia is doing quite well. The data shows that Australia's minimum is higher than other countries, however the lower quartile, median, upper quartile and maximum of Australia is lower than that of other Countries. It also shows that other countries have a larger range and therefore have dropped lower than Australia.

ANALYSIS:

The aim of the investigation was to prove the hypothesis using statistical analysis. Therefore proving or disproving, that since 2005 Australia's cotton export has increased while the export in other countries has decreased. According to the statistical analysis the hypothesis is correct, showing that the export of cotton in Australia has in fact increased over the time period of 2005-2013. It also shows that other countries have decreased as the hypothesis states

According to the data, the background information (*found in the introduction)* is correct. It shows that Australia is in fact the world's second largest exporter of cotton. It also shows that most Asian countries such as China and Indonesia rely on Australia for its cotton, as these countries did not make the top 6 exporters list.

Some common trends of the investigation can be found in the results section which helps to prove that the hypothesis is correct. In *Figure 1.1* and *1.2* the table and graph prove that during the time period of 2005-2013 the cotton export increased. *Figure 1.2* displays the data having a positive correlation, which is therefore evidence of increase. Another example of an increase is that difference between minimums, Australia had a higher minimum than other countries. With Australia having a minimum of 260 and the other countries having 71, this is found in *Figure 3.2*. The next part to proving the hypothesis was to show that the other countries have decreased. In *Figure 2.2* it shows that many countries have in fact decreased in amount of cotton exported, some dramatic decreases include: Mali, America and Uzbekistan. To then prove the hypothesis entirely correct it must be shown that while the other countries decreased, Australia did not, to do this the comparison is to be made between *Figure 1.2* and *2.2*. In *Figure 1.2* the graph shows that Australia has increased over the last 8 years and *Figure 2.2* shows that all the other countries have decreased. Therefore the results section, entirely prove the hypothesis to be correct.

Throughout the report there may have been possible sources of error, for example: unreliable sources/statistics, inaccurate measurements of cotton and exports, or incorrect statistical analysis of data. All of these possible sources of error could result in an unreliable and inaccurate report.

The report can be further investigated and give further details by, showing the exports of each country involved to prove that Australia is in fact the second largest exporter of cotton. It can also be furthered by investigating why some years the amount of cotton exported decreases, for example: effect of drought or flood. Another way to further the investigation is to take into account if the country is a third or first world country, like the comparison between Mali and America

The improvements that could be made to this investigation may include: further detail into graphs, further explanation into what is displayed and a higher amount of detail and preciseness when it comes to proving or disproving the hypothesis.

Having come to the conclusion, the effectiveness of the investigation showed how globally renowned Australia is when it comes to the export of cotton. Overall, the data was easy to collate the data and to recognise the key trends. However, it was difficult to present, show and explain what was detected. The information collect was useful and gave more of an understanding and appreciation for Australia's cotton farmers and the export market.

CONCLUSION:

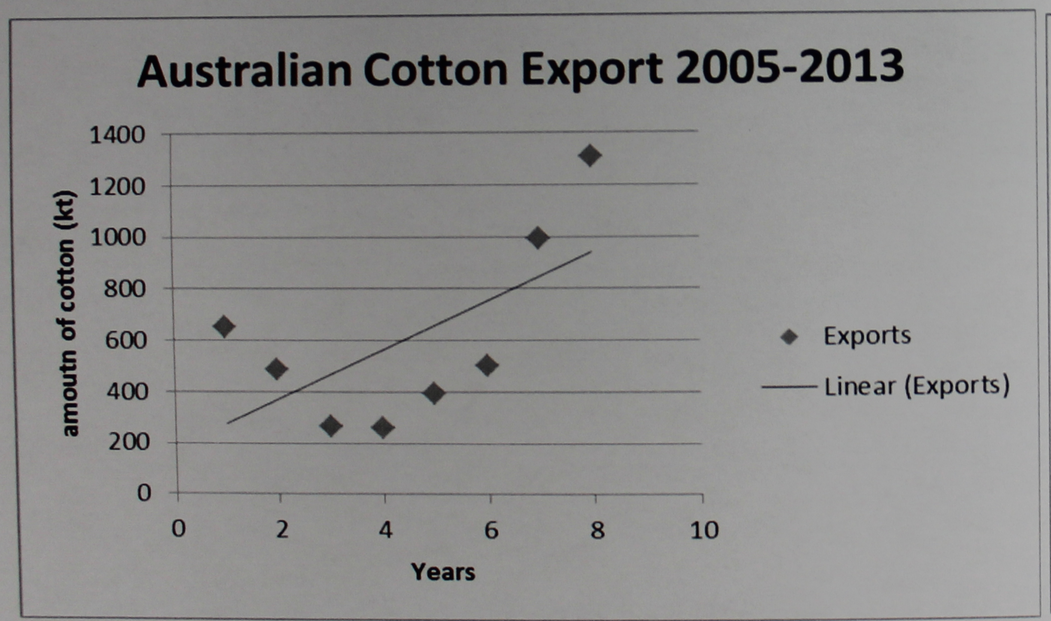
It can be concluded that Australia's export has increased over the timespan from 2005-2013 and that other countries export has decreased. This was determined by the statistical analysis performed in PART A and the findings in the report section due to graphs, tables and box plots. Therefore, the initial hypothesis which states that since 2005 Australia's cotton export has increased while the export in other countries has decreased is supported by the investigation.

BIBLIOGRAPHY:

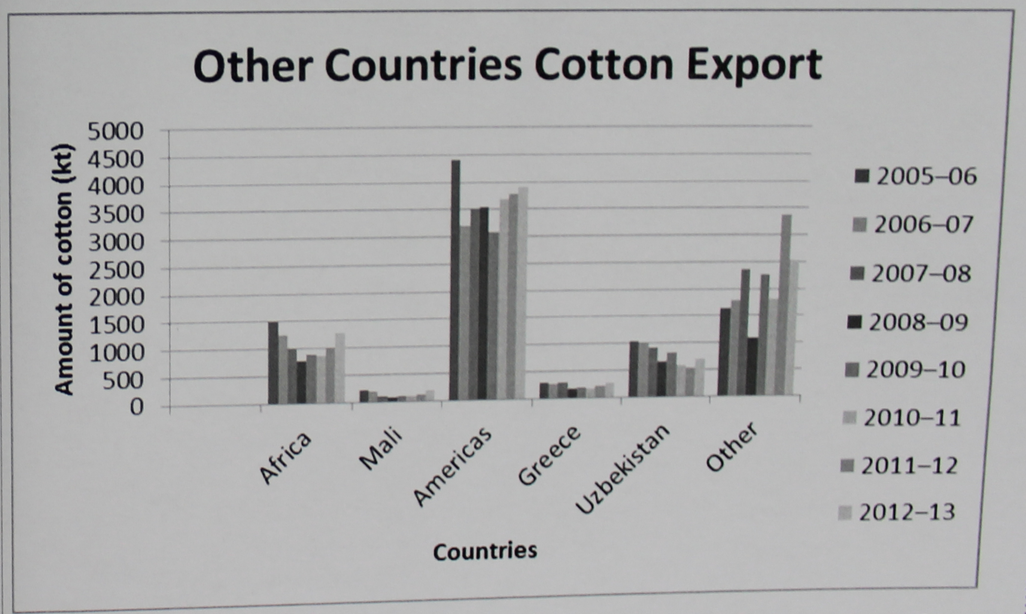
- **http://data.daff.gov.au/data/warehouse/agcstd9abcc002/agcstd9abcc0022013/ACS2013_Cotton_Tables_v1.0.0.xls**
- http://cottonaustralia.com.au/
- http://www.daff.gov.au/

The Cotton Industy

Since 2005 Australia's cotton export has increased while the export in other countries has decreased.



Proves the hypothesis by showing the positive correlation and increase of Australia's cotton export.



Shows that other countries export has decreased, which proves the hypothesis correct