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NZQA

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Level 1 Mathematics and Statistics, 2019

91037 Demonstrate understanding of chance and data

9.30 a.m. Wednesday 20 November 2019
Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of chance and data.	Demonstrate understanding of chance and data, justifying statements and findings.	Demonstrate understanding of chance and data, showing statistical insight.

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

You should attempt ALL the questions in this booklet.

Show ALL working.

If you need more room for any answer, use the extra space provided at the back of this booklet.

Check that this booklet has pages 2–16 in the correct order and that none of these pages is blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

TOTAL

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QUESTION ONE

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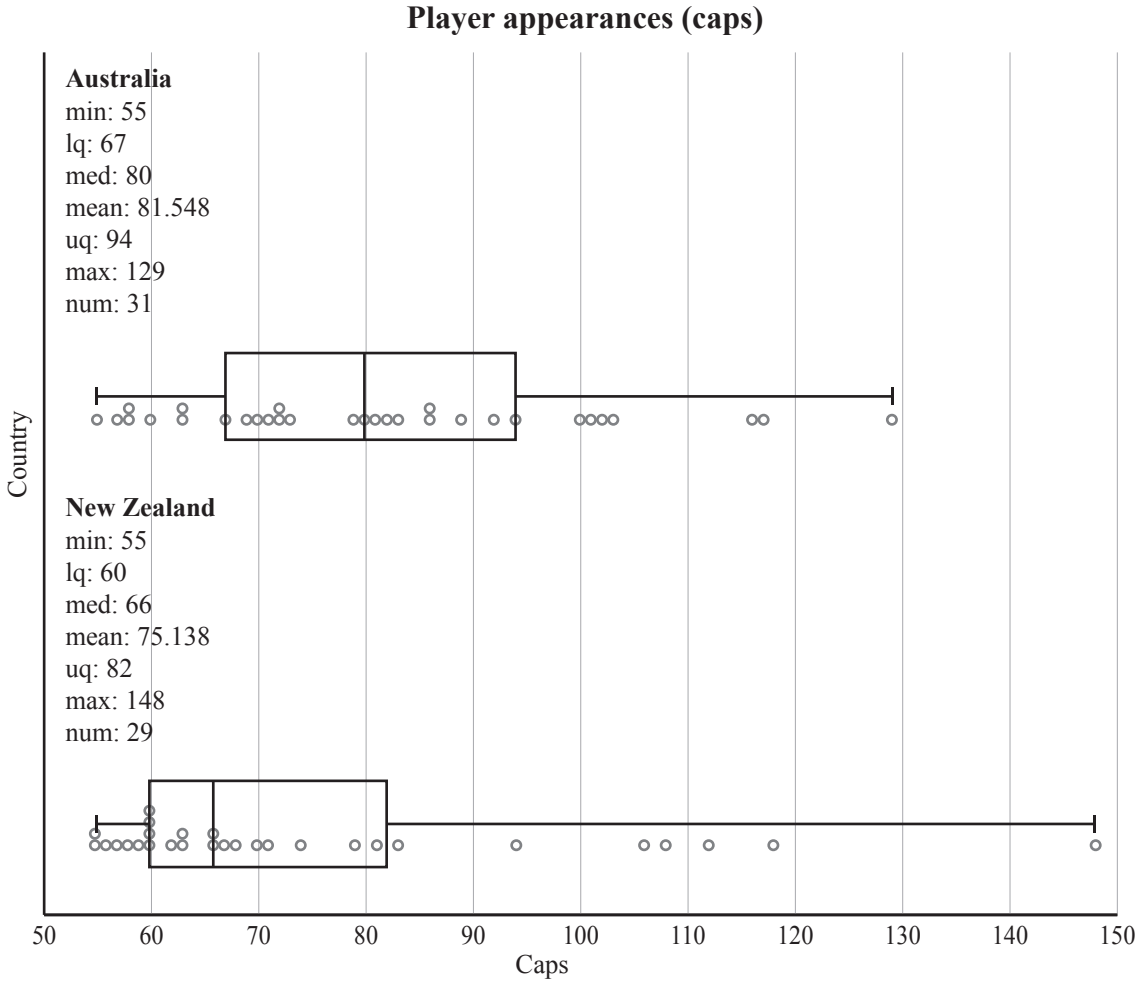
(a) An international rugby player is awarded a "cap" each time they represent their country in a match.

The display below compares a random sample of Australian and New Zealand male rugby players who have represented their country in international matches at least 55 times.

The data has been collected from the ESPN website and includes appearances up to the end of 2018.



(i) Using the data provided above, what is the inter-quartile range for the caps gained by Australian rugby players?

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(ii) Using the data provided, which team has the greatest variation in the number of caps that their players have received?

Justify your answer using statistical reasons.

(iii) Clearly describe any significant features in the sample distributions of the number of caps for both Australian and New Zealand rugby players.

Note any similarities and differences as well as any unusual features.

Graph below is repeated from page 2

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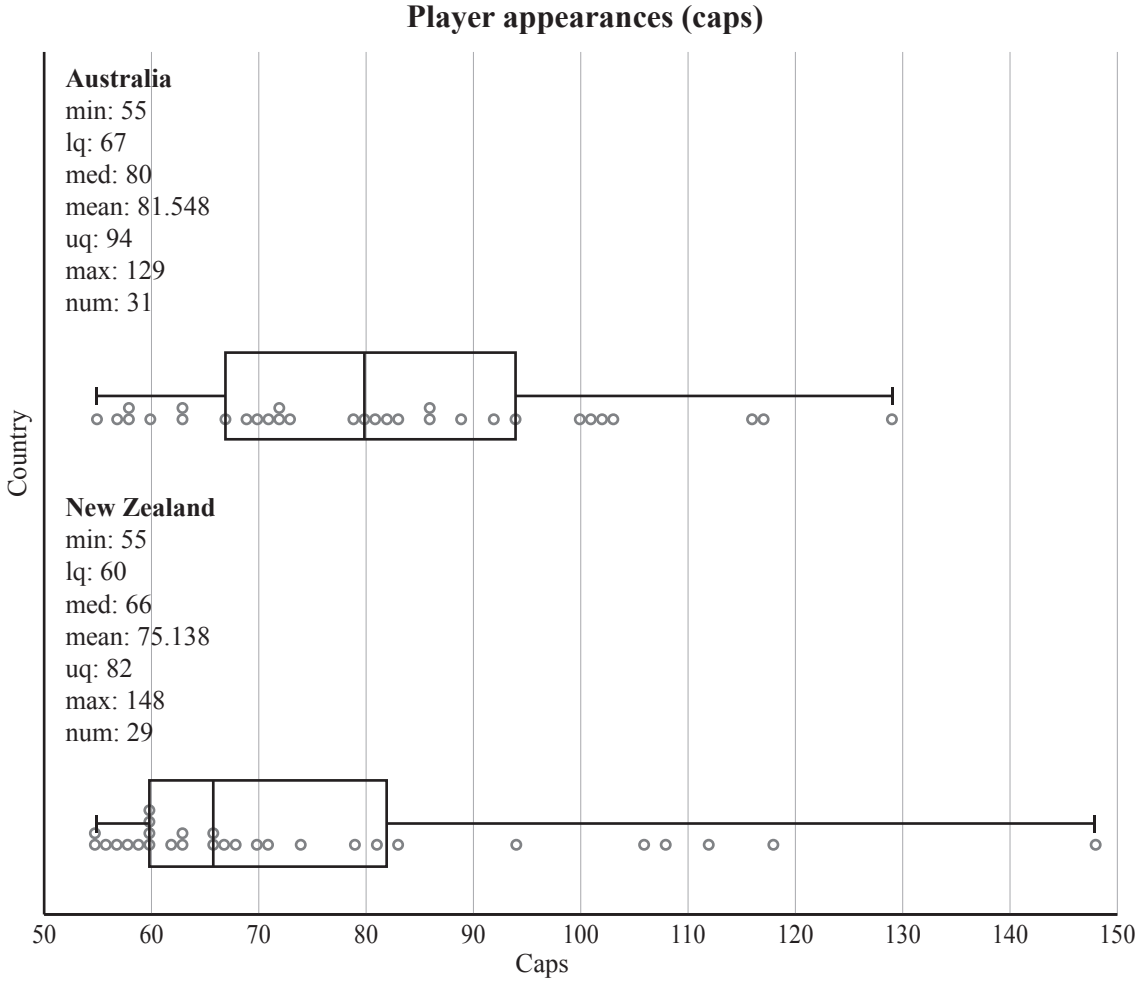

(iv) A magazine claims that New Zealand players have more caps than Australian players.

Comment on the magazine's claim, based on the sample of players provided.

Justify your answer using statistical reasons.

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(b) Injury is a common occurrence in rugby. Some say that there is a higher chance of being injured in rugby compared to other sports.

The table below shows minor injuries that were reported in different sports during 2018 within New Zealand for a random sample of 300 sports players. This was recorded by gender.

	Rugby	**Netball**	**Cricket**	**Football**
Female	20	60	15	10
Male	70	30	25	70

(i) Based on these figures, what is the probability a player who suffered a minor injury played rugby?

(ii) Based on these figures, which sport had the highest chance of one of its male players suffering a minor injury?

Justify your answer clearly.

QUESTION TWO

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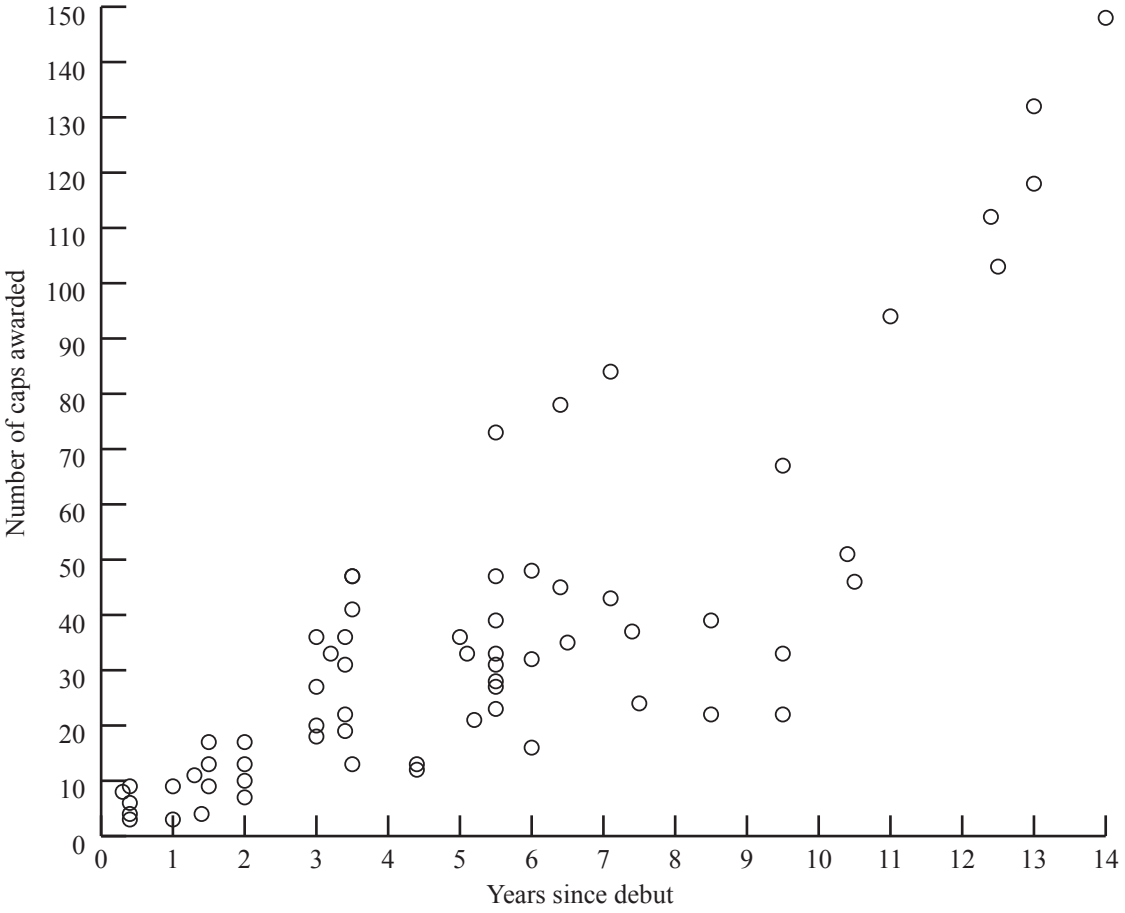
(a) The graph below shows, for rugby players representing New Zealand and Fiji, the relationship between the number of years since debut (i.e. number of years they have been representing their country) and the number of caps they have received since their debut.

Years since debut v Number of caps awarded



(i) On the graph above, draw a line that best approximates the relationship between "Years since debut" versus "Number of caps awarded" for rugby players representing New Zealand and Fiji.

Comment on the appropriateness of this model and whether some other model would best fit.

If you need to redo (i), use the graph on page 15.

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(ii) Describe and interpret at least two features visible in the graph of "Years since debut" versus "Number of caps awarded" for rugby players representing New Zealand and Fiji.

(iii) How useful is this graph to predict the number of caps awarded to an international rugby player based on the number of years since they first played for their country?

Justify your answer using statistical reasons.

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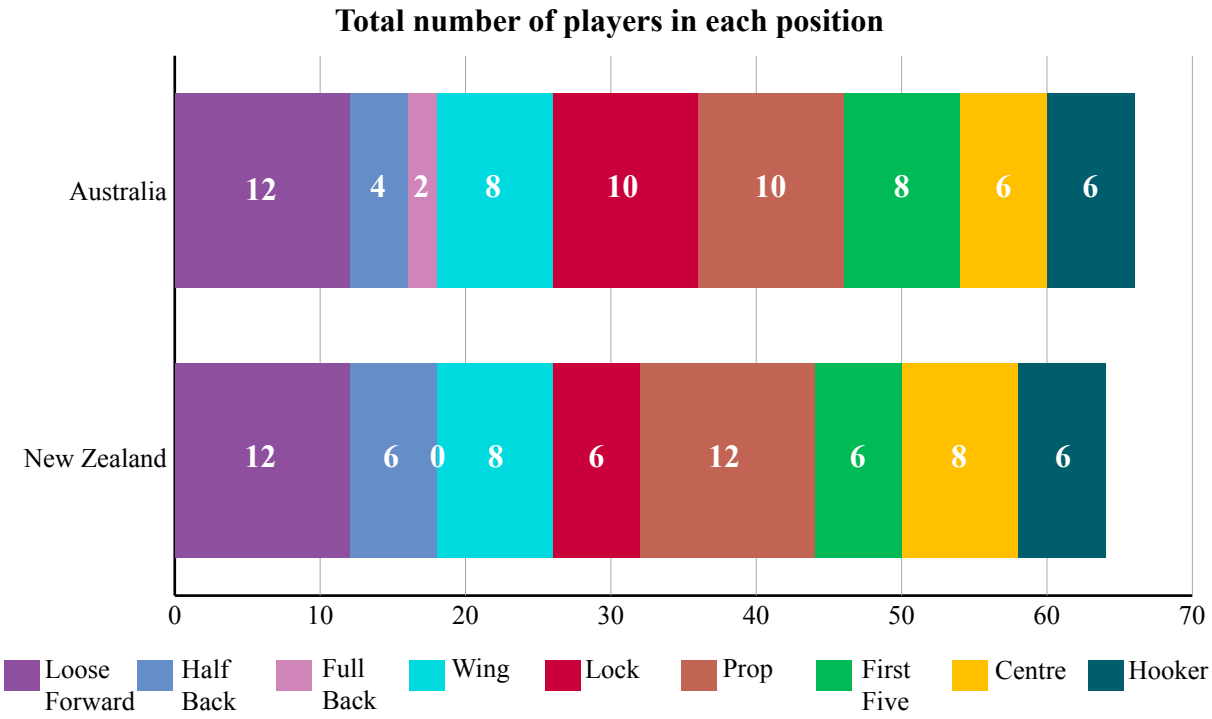
(b) A rugby team has various names for the different playing positions.

The display below compares a random sample of New Zealand and Australian male rugby players who have represented their country in matches.

The graph below shows the total number of players that are in each position from the New Zealand and Australian rugby teams.



(i) What is the name of the position in the Australian team with the most players?

Justify your answer.

(ii) Discuss at least two other ways in which this data could be displayed.
State the advantages and disadvantages of each method.

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QUESTION THREE

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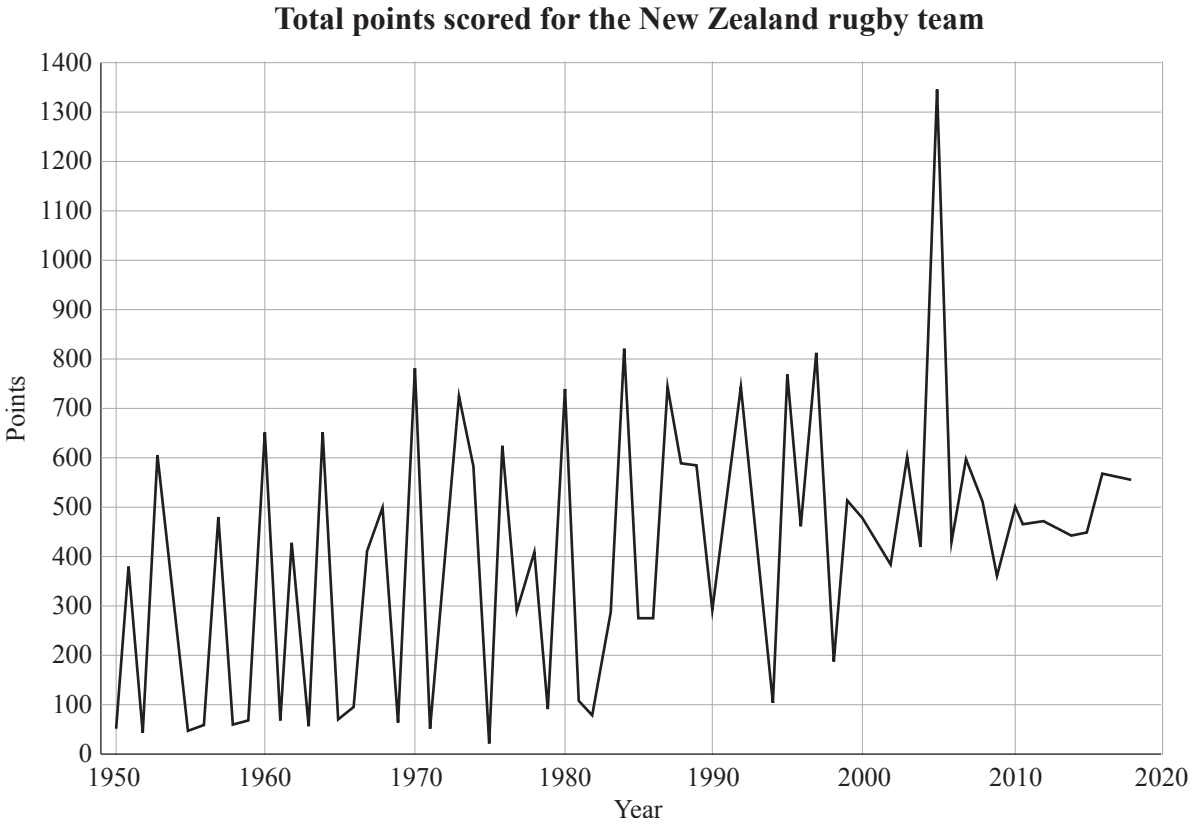
(a) The graph below shows the total number of points that the New Zealand rugby team has scored each year between 1950 and 2018.



(i) In what year did the New Zealand rugby team score the least amount of points?

Justify your answer.

(ii) Discuss any trends, regular patterns, and unusual features that you notice in the graph opposite.

Provide evidence from the graph to back up your statements.

Justify your answer using statistical reasons.

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Question 3 continues on page 12 ➤

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(b) The table below shows the number of players in various age categories of both Australian and New Zealand male rugby players who have represented their country in matches.

110 players were included in the survey.

	21 to 25 years old	**26 to 30 years old**	**31 to 36 years old**
Australia	14	16	16
New Zealand	20	24	20

(i) What is the probability that a randomly selected player was Australian and aged between 26 and 30 years old?

(ii) What is the probability that a randomly selected player from New Zealand was aged between 21 and 25 years old?

(iii) What is the probability that a player chosen at random was Australian and aged between 21 and 25 years old or a New Zealander aged between 26 and 30 years old?

(iv) Two players are chosen at random to win an award.

What is the probability that both players chosen are New Zealanders aged between 21 and 25 years old?

Extra space if required.
Write the question number(s) if applicable.

QUESTION NUMBER

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Extra space if required.
Write the question number(s) if applicable.

QUESTION NUMBER

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SPARE GRAPHS

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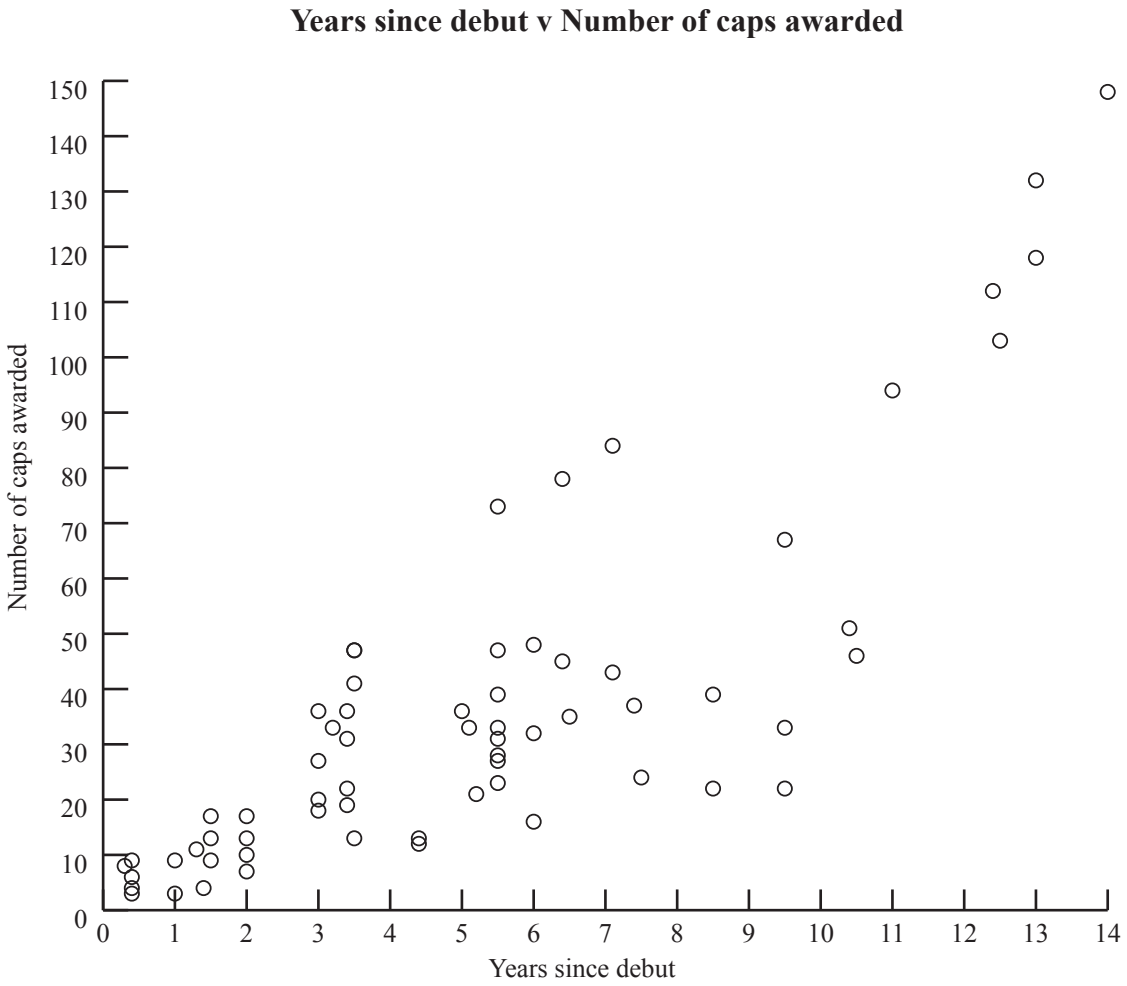
If you need to redo Question Two (a)(i), use the graph below. Make sure you make it clear which answer you want marked.

QUESTION TWO



(i) On the graph above, draw a line that best approximates the relationship between "Years since debut" versus "Number of caps awarded" for rugby players representing New Zealand and Fiji.

Comment on the appropriateness of this line as a model and whether some other model would best fit.

Extra space if required.
Write the question number(s) if applicable.

QUESTION NUMBER

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