F07-10min Spearman's Rank Interpretation: 10-minute Pack

Total Marks

EDEXCEL 1ST0 · Calculator allowed · about 10 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Two teachers, Mr Ahmed and Mrs Patel, each rank the same 5 pupils' handwriting from 1 (neatest) to 5 (least neat), without seeing each other's results.

Pupil	Mr Ahmed rank	Mrs Patel rank
Priya	1	1
Sam	2	2
Owen	3	3
Fatima	4	4
Leo	5	5

The Spearman's rank correlation coefficient for the two teachers' rankings is rs = 1.

(a) Write down what is true about the two teachers' rank orders when rs = 1. **(1)**

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(b) State what rs = 1 tells you about the strength and direction of the agreement between the two teachers. **(1)**

(c) A third teacher, Mr Owusu, ranks the same 5 pupils and gets rs = 0.9 when compared with Mr Ahmed. Explain why this shows slightly less agreement than Mrs Patel's ranking. **(1)**

(Total for Question 1 is 3 marks)

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2 State whether rs = 0.72 shows a positive or negative association.

(Total for Question 2 is 1 mark)

3 Write down whether rs = 0.98 is closer to 0 or closer to 1.

(Total for Question 3 is 1 mark)

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4 For each statement about Spearman's rank correlation coefficient, write down whether it is True or False.

(i) A Spearman's rank correlation coefficient can only take values between -1 and 1. **(1)**

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(ii) A coefficient of rs = -0.8 shows a weaker association than a coefficient of rs = 0.3. **(1)**

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(iii) If two rankings are identical, the Spearman's rank correlation coefficient must be 1. **(1)**

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(iv) A coefficient close to 0 always means the two quantities being ranked are completely unrelated in every way. **(1)**

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(Total for Question 4 is 4 marks)

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5 Four students each describe a scatter graph they have drawn comparing two sets of rankings.

(a) Which description best matches a Spearman's rank correlation coefficient of rs = -0.85? **(1)**

- ☐ A) Points lie close to a straight line that rises from bottom-left to top-right.
- ☐ B) Points lie close to a straight line that falls from top-left to bottom-right.
- ☐ C) Points are scattered with no clear pattern at all.
- ☐ D) Points lie exactly on a horizontal line.

(b) Give one reason why your chosen description fits a strongly negative coefficient. **(1)**

(Total for Question 5 is 2 marks)

Mark scheme · F07-10min Spearman's Rank Interpretation: 10-minute Pack

Question 1

- (a) **B1** the two rank orders are identical/exactly the same oe
- **(a) Answer: The two rank orders are exactly the same.**
- (b) **B1** perfect positive agreement cao (oe: complete/total agreement)
- **(b) Answer: Perfect positive agreement.**
- (c) **B1** 0.9 is not the maximum possible value, so the rankings are not identical, only very similar oe
- **(c) Answer: 0.9 is slightly less than 1, showing the rankings are very similar but not identical.**

Question 2

- **B1** Positive cao
- **Answer: Positive**

Question 3

- **B1** Closer to 1 cao
- **Answer: Closer to 1**

Question 4

- (i) **B1** True cao
- **(i) Answer: True**
- (ii) **B1** False cao
- **(ii) Answer: False**
- (iii) **B1** True cao
- **(iii) Answer: True**
- (iv) **B1** False cao
- **(iv) Answer: False**

Question 5

- (a) **B1** B cao
- **(a) Answer: B) Points lie close to a straight line that falls from top-left to bottom-right.**
- (b) **B1** a falling pattern shows that as one ranking increases the other tends to decrease, and rs is close to -1 so the points lie close to a line oe
- **(b) Answer: As one rank increases the other tends to decrease, and because -0.85 is close to -1 the points lie close to a straight line.**