2 The table shows the season's best times, x seconds, for the 8 athletes who took part in the 200 m final in the 2021 Tokyo Olympics. It also shows their finishing position in the race.

Athlete	*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*
Season's best time	19.89	19.83	19.74	19.84	19.91	19.99	20.13	20.10
Finishing position	1	2	3	4	5	6	7	8

Given that the fastest season's best time is ranked number 1

(a) calculate the value of the Spearman's rank correlation coefficient for these data.

(4)

(b) Stating your hypotheses clearly, test, at the 1% level of significance, whether or not there is evidence of a positive correlation between the rank of the season's best time and the finishing position for these athletes.

(4)

Chris suggests that it would be better to use the actual finishing time, y seconds, of these athletes rather than their finishing position.

Given that

$$S_{xx} = 0.1286875 \qquad S_{yy} = 0.55275 \qquad S_{xy} = 0.225175$$

(c) calculate the product moment correlation coefficient between the season's best time and the finishing time for these athletes.
Give your answer correct to 3 decimal places.

(2)

(d) Use your value of the product moment correlation coefficient to test, at the 1% level of significance, whether or not there is evidence of a positive correlation between the season's best time and the finishing time for these athletes.

(2)

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Question 2 continued

(Total for Question 2 is 12 marks)