3. A medical research team carried out an investigation into the metabolic rate, MR, of men aged between 30 years and 60 years.

A random sample of 10 men was taken from this age group.

The table below shows for each man his MR and his body mass index, BMI. The table also shows the rank for the level of daily physical activity, DPA, which was assessed by the medical research team.

Rank 1 was assigned to the man with the highest level of daily physical activity.

Man	*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*
MR (*x*)	6.24	5.94	6.83	6.53	6.31	7.44	7.32	8.70	7.88	7.78
BMI (*y*)	19.6	19.2	23.6	21.4	20.2	20.8	22.9	25.5	23.3	25.1
DPA rank	10	7	9	8	6	3	1	4	5	2

[You may use $S_{xy} = 15.1608$ $S_{xx} = 6.901\,81$ $S_{yy} = 45.304$]

(a) Calculate the value of the product moment correlation coefficient between MR and BMI for these 10 men.

(2)

(b) Use your value of the product moment correlation coefficient to test, at the 5% significance level, whether or not there is evidence of a positive correlation between MR and BMI.
State your hypotheses clearly.

(3)

(c) State an assumption that must be made to carry out the test in part (b).

(1)

(d) Calculate the value of Spearman's rank correlation coefficient between MR and DPA for these 10 men.

(4)

(e) Use a two-tailed test and a 5% level of significance to assess whether or not there is evidence of a correlation between MR and DPA.

(2)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

Question 3 continued

Question 3 continued

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

Question 3 continued

(Total for Question 3 is 12 marks)