

3. Helen is investigating the relationship between average income (GDP per capita), x US dollars, and average annual carbon dioxide (CO_2) emissions, y tonnes, for different countries.

She takes a random sample of the 24 countries and finds the product moment correlation average annual CO_2 , emission and the average income to be 0.4771.

- (a) Stating your hypotheses clearly, test, at the 5% level of significance, whether or not the product moment correlation coefficient for all countries is greater than zero.

(3)

Helen believes that a non-linear model would be a better fit to the data. She codes the data using the coding $m = \log_{10}(x)$ and $c = \log_{10}(y)$ and obtains the model $c = -0.47 + 0.92m$.

The product moment correlation coefficient between c and m is found to be 0.8432.

- (b) Explain how this value supports Helen's belief.

(1)

- (c) Show that the relationship between y and x can be written in the form $y = ax^n$ where a and n are constants to be found. Give your answers to 2 decimal places.

(5)

(Total for Question 3 is 9 marks)