Question 6

A company operates an express coach service between seven cities, $c_1, c_2, \ldots, c_7$. The number of other cities to which each city is directly linked by a coach is given in the following table.

City	c_1	c_2	c_3	c_4	c_5	c_6	c_7
Number of connections	3	2	3	5	4	4	1

(a) Describe how such a communications network can be modelled by a *graph*, saying what the vertices represent and a rule for determining when two vertices are adjacent. [2]

(b) Calculate how many pairs of cities have a direct coach link between them, giving a brief explanation of your method. [3]

(c) What is meant by saying that a graph is *simple*? Say why a graph model of this communications network would be simple. [3]

(d) Is it possible to construct a graph with degree sequence 4, 4, 4, 3, 3, 2, 1? Either construct an example of such a graph, or say why it is not possible to do so. [2]