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2008 Test 1
F11ME3 Algebra 3/graph theory

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Each question is worth 1 mark and will be marked right or wrong only.

The picture below shows the Coxeter graph which is referred to in Questions 1 and 2.

1. How many *vertices* does the Coxeter graph have?

2. How many *edges* does the Coxeter graph have?

3. Draw, if possible, a graph with degree sequence $(0, 2, 2, 2, 3, 3)$.

4. Draw, if possible, a graph with degree sequence $(0, 1, 2, 2, 3, 3)$.

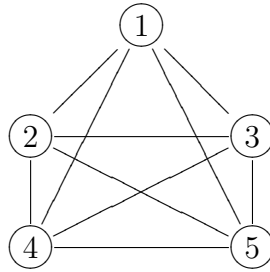5. Write down the adjacency matrix of the following graph.

<div align="center">
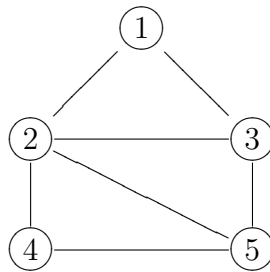
Test continues

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6. Draw the graph corresponding to the following adjacency matrix.

$$\begin{pmatrix} 0 & 1 & 2 & 0 \\ 1 & 0 & 1 & 0 \\ 2 & 1 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{pmatrix}$$

7. How many edges does the graph K_{153} have?

8. How many paths are there of length 6 joining vertex 2 to vertex 4 in the following graph?

9. Consider the 'chess-board' below.

1	2	3	4
5	6	7	8
9	10	11	12

Draw a graph **without edges crossing** whose vertices are labelled 1,2, ... ,12, and where two vertices m and n are joined by an edge only when a knight can move from square m to square n (and back).

10. Let $X = \{1, 2, 3, 4\}$. Draw the **simple** graph whose vertices are the subsets of X having exactly two elements, and where an edge is drawn joining vertices A and B if $A \cap B$ contains exactly one element.

Test concludes