## COMPUTER SCIENCE TRIPOS Part IA 75\%, Part IB 50\% - 2018 - Paper 3

## 9 Machine Learning and Real-world Data (AAC)

This question concerns undirected graphs which consist of three fully interconnected regions each connected via a single link to a central node. Each fully interconnected region has at least three nodes. See the figure below for an example where the regions are of size 3,3 and 4 .

(a) What is the diameter of such a graph? Justify your answer.
(b) Which edges are local bridges?
(c) What is the betweenness centrality of the central node? Explain your answer.
[6 marks]
(d) What clusters result if you successively break links in the order given by their edge betweenness centrality (i.e., according to the Newman-Girvan method)?
(e) Give an example of a real world situation which might correspond to such a graph. Be explicit about the nature of the nodes and links. Is the clustering result intuitively reasonable for this situation?

