Example Involving a Graph (2022)

Prepared by:

Joseph Malkevitch
Mathematics Department
York College (CUNY)
Jamaica, NY 11451

email:

malkevitch@york.cuny.edu

web page:

http://york.cuny.edu

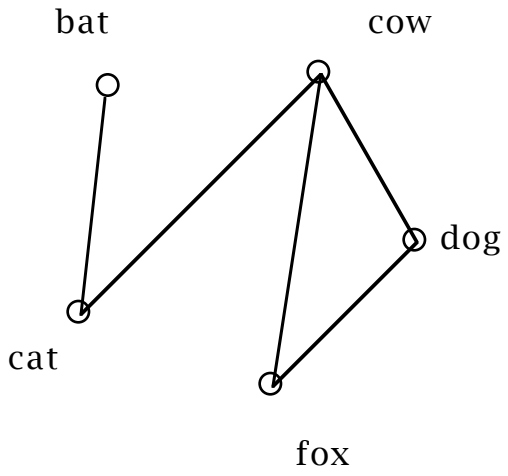
Here is a collection of some "animals," as it happens, the name of each of the animals involves three distinct letters, but some have the same first letter:

Fox Cat Dog Cow Bat

Use a dot to represent each animal - vertex of a graph.

Us a straight or curved line segment to join two vertices if the spelling of the animals they represent share at least one letter.

Here is the resulting graph, which is connected, that is in one piece. Put differently one can walk along edges to get from any vertex to any other vertex.



Notes:

1. The graph does not tell one anything about the biology of the animals but it does some "relations" between the spelling of their names. When one types bat one can by a single spelling error "transform" it into a bit, and vice versa. Though bat is joined by an edge to cat and cat is joined by an edge to cow, in one case one can make a single spelling mistake to get to the other while in the other case one needs to make two spelling errors to transform one word to the other.

2. Can you give an interpretation of the meaning that some vertices require a "path" of length three to get between them, while others require paths of lengths one or two to get between these vertices.

3. Add some other animals whose names also involve three letters and draw a graph for the larger set of animals you consider.

For this larger graph are you able to draw the graph so that edges meet only at vertices, as is the case in the graph above. Graphs with this potential are called planar graphs and graphs which can be drawn in the plane so that edges meet only at vertices are called plane graphs or are said to have been embedded in the plane.