Bipartite Graph Characterization

Consider the Complete Bipartite graph \( K_{3,2} \) shown to the right.

A. Write the adjacency matrix for this graph.

B. Recall that the diagonal entries of \( A^n \) is the number of circuits of length \( n \).
   Determine the entries of \( A^2, A^3, A^4, A^5, \ldots \) using a calculator (I will write them on the board)
   Write the diagonal entries as a list below.
   \[
   A^2 \implies A^3 \implies A^4 \implies A^5 \implies 
   \]

C. What do you notice about the odd powers of \( A \)?

D. Create any other bipartite graph (not complete) and determine if your conjecture is true for that graph as well.

E. Assuming that your conjecture is correct write a theorem which states your findings.