Explanation of Problem 4.1:

if G is bipartite with vertex sets V1 and V2, each progression alone a walk takes us either from V1 to V2 or from V2 to V1. To end up where we began, we have to make a even number of steps.

On the other hand, assume that each cycle of G is even. Let v0 be any vertex. For every vertex v in a similar part C0 as v0 let d(v) be the length of the shortest path way from v0 to v. Shading red each vertex in C0 whose distance from v0 is even, and shading the different vertices of C0 blue. Do likewise for every segment of G. Watch that if G had any edge between two red vertices or between two blue vertices, it would have an odd cycle. Subsequently, G is bipartite, the red vertices and the blue vertices being the two sections.

Hence we can prove that a bipartite graph is possible if there is no odd cycle.

Same implementation is provided in exercise_3_bipartite.c program.