

Group Work on Graphs
CS 24, Dr. Ostheimer

Let $G = (U, E)$ be a simple, undirected graph. G is *april-like* if there exist $U_1, U_2 \subseteq U$ such that

- $U_1 \cup U_2 = U$,
- U_1 and U_2 are disjoint, and
- for all $\{u, v\} \in E$ either $u \in U_1$ and $v \in U_2$ or $v \in U_1$ and $u \in U_2$.

For all of this group work, assume that by *graph* we mean simple, undirected graph.

- (1) For each of the questions below, draw a picture of a graph that meets the stated criteria, or state that no such graph exists

(a) a complete graph K_n which is also april-like

(b) a complete graph K_n which is not april-like

(c) an april-like graph with degree sequence $3, 3, 3, 3, 3, 3, 3, 3$

(d) a graph with degree sequence $3, 3, 3, 3, 3, 3$ that is not april-like

(e) a graph with degree sequence $0, 1, 1, 1, 2, 2, 3$ that is april-like

(f) a graph with degree sequence $0, 1, 1, 1, 2, 2, 3$ that is not april-like

- (2) Are the following statements true or false? Provide counterexamples for those that are false.
- (a) If G and H have the same degree sequence, then they have the same number of vertices and edges.
 - (b) If G and H have the same number of vertices and edges, then they have the same degree sequence.
 - (c) If G and H are graphs with the same degree sequence, and if G is april-like, then so is H .