CS2022/MA2201
HW#9

DUE: Thursday, October 14

1. (2 points) Which of the following are partitions of {1,2,3,...,10}
(*a*) {2,4,6,8}, {1,3,5,9}, {7,10}
(*b*) {1,2,4,8},{2,5,7,10},{3,6,9}
(*c*) {3,8,10}, {1,2,5,9}, {4,7,8}
(*d*) {1}, {2,},...,{10}
(*e*) {1,2,...,10}.

2. (3 points) Let R be the relation on $A = \{1,2,3,4,5\}$ where
$R = \{ (1,1), (1,3), (1,4), (2,2), (3,1), (3,3), (3,4),(4,1),(4,3),(4,4),(5,5)\}$.
(*a*) Write the matrix for R.
(*b*) Draw the directed graph for R.
(*c*) Find the equivalence classes for the partition of A given by R.

3. (17 points) For each of the following, either give an example or state that there are none:
(*a*) A simple graph with 6 vertices, whose degrees are 2,2,2,3,4,4.
(*b*) A simple graph with 8 vertices, whose degrees are 0,1,2,3,4,5,6,7.
(*c*) A simple graph with degrees 1,2,2,3.
(*d*) A simple graph with degrees 2,3,4,4,4.
(*e*) A simple graph with degrees 1,1,1,5.
(*f*) A simple digraph with indegrees 0,1,2 and outdegrees 0,1,2.
(*g*) A simple digraph with indegrees 1,1,1 and outdegrees 1,1,1.
(*h*) A simple digraph with indegrees 0,1,2,2 and outdegrees 0,1,1,3.
(*i*) A simple digraph with indegrees 0,1,2,4,5 and outdegrees 0,3,3,3,3.
(*j*) A simple digraph with indegrees 0,1,1,2 and outdegrees 0,1,1,1.
(*k*) A simple digraph with indegrees: 0,1,2,2,3,4 and outdegrees: 1,1,2,2,3,4.
(*l*) A simple graph with 6 vertices and 16 edges.
(*m*) A graph with 7 vertices that has a Hamilton circuit but no Euler circuit.
(*n*) A graph with 6 vertices that has an Euler circuit but no Hamilton circuit.
(*o*) A graph with a Hamilton path but no Hamilton circuit.
(*p*) A graph with a Hamilton circuit but no Hamilton path.
(*q*) A bipartite graph with an odd number of vertices that has a Hamilton circuit.