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.