# Homework Assignment 2 

CSCI 2405
Spring 2020
Section 001

1. Draw a diagram of each of the following graphs.
(a) $K_{6}$
(b) $K_{1,8}$
(c) $K_{4,4}$
(d) $C_{7}$
(e) $Q_{4}$
2. Suppose that a new company has five employees: Zamora, Agraharan, Smith, Chou and Macintyre. Each employee will assume one of six responsibilities: planning, publicity, sales, marketing, development and industry relations. Each empolyeee is capable of doing one or more of these jobs: Zamora can do planning, sales, marketing or industry relations; Agraharam can do planning or development; Smith can do publicity, sales or industry relations; Chou can do planning, sales or industry relations; and Macintyre can do planning, publicity, sales or undustry relations.
(a) Model the capabilities of the empolyees using a bipartite graph.
(b) Find an assignment of responsibilities such that each employee is assigned one responsibility.
(c) Is the matching of responsibilities that you found in (b) a complete matching?
(d) Is the matching of responsibilities that you found in (b) a maximal matching?
3. For which values of $m$ and $n$ is $K_{m, n}$ regular?
4. Do exercise 38 on page 711 (Section 10.3) of Rosen, eighth edition.
5. Do exercise 39 on page 711 (Section 10.3) of Rosen, eighth edition.
6. Do exercise 40 on page 711 (Section 10.3) of Rosen, eighth edition.
7. Do exercise 41 on page 712 (Section 10.3) of Rosen, eighth edition.
8. Do exercise 42 on page 712 (Section 10.3) of Rosen, eighth edition.
9. Do exercise 43 on page 712 (Section 10.3) of Rosen, eighth edition.
10. Do exercise 44 on page 712 (Section 10.3) of Rosen, eighth edition.
11. Suppose that $G$ and $H$ are isomorphic simple graphs. Show that $\bar{G}$ and $\bar{H}$ are also isomorphic.
12. Do exercises $3-5$ beginning on page 724 (Section 10.4) of Rosen, eighth edition.
13. How many connected components does each graph in the preceding problem have?
14. Do problem 14 (a-c) on page 725 (Section 10.4) of Rosen, eighth edition.
15. Do problem 20 on page 726 (Section 10.4) of Rosen, eighth edition.
16. Do problem 5 on page 760 (Section 10.7) of Rosen, eighth edition.
17. Do problem 6 on page 760 (Section 10.7) of Rosen, eighth edition.
18. Suppose that a particular planar graph has 30 edges. If a planar representation of this graph divides the plane into 20 regions, how many vertices does this graph have?
19. Suppose that a particular planar graph has $k$ connected components, $e$ edges and $v$ vertices. Also suppose that the plane is divided into $r$ regions by a planar representation of the graph. Find a formula for $r$ in terms of $e, v$ and $k$.
20. Do problem 20 on page 761 (Section 10.7) of Rosen, eighth edition.
21. Do problem 24 on page 761 (Section 10.7) of Rosen, eighth edition.
