Discrete Math
Group HW #4
Graph Fever
Due M 25 Oct

Please reread the guidelines for group work, copied here from the Course Info Sheet:

Group Problem Sets: These problem sets will be more challenging, and they will be done in pre-assigned groups. You are required to try each problem on your own before meeting with your group. You are encouraged to solve these problems only with your team-mates. Any collaboration with other students outside your group must be cited. Your group will hand in one solution set, and all group members will receive the same grade. Group compositions will likely change once during the semester.

Keeping these guidelines (which were designed to help each person succeed!) in mind, please write a new team contract. If you are with the same team, please take a few moments to reflect on any changes you might want to make to improve your individual learning.

As needed, you may use results from your textbook in your proofs/solutions, but be very specific about what you are using and why you are justified in using it.

8.2: 36 (see text above #35 for definition), 42 (see #41 for notation)

8.3: 50, 69 (give a different answer than the back of the book's answer)

8.4: 22 (Hint: Never assume a graph is connected unless it says so, but you can consider connected components.)

8.5: 56

8.7: 16

Non-book #1:

A "soccer" ball is formed by stitching together pieces of material that are regular pentagons and regular hexagons. The lengths of the sides of these polygons are all the same, so the edges match up exactly. Each corner of a polygon is the meeting place for exactly three polygons. Prove that there must be exactly 12 pentagons. (Use graph theory to prove it.) (The exact pattern of the sewing together does not matter – it does not have to look like a real soccer ball, so do not assume that you know the exact way that hexagons and pentagons are sewn together on a real soccer ball.)

Non-book #2:

A 3 by 3 by 3 block of cheese is divided into 27 1 by 1 by 1 blocks. A mouse eats one cube per day, such that each day he eats a cube adjacent (sharing a face) to the cube eaten the previous day. Can the mouse eat the center cube on the last day? (Use graph theory to prove it.)

Please include a **short report** of how your team worked (who did what? any issues addressed or needing to be addressed?).