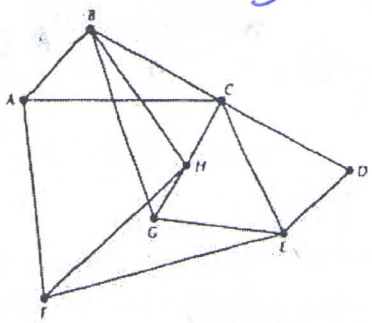
Worksheet #6 Graph Theory Applications--Scheduling

* Answers may vary *

Directions: Draw a graph (unless already given) and summarize your answer to each scheduling question.

1. Suppose Jan is mad at Emily and Pam, Emily is mad at Tom, and Tom is mad at Jan. Draw a graph to represent the situation.

2. Ms. Suzuki is planning to take her history class to the art museum. Following is a graph showing those students who are not compatible. Assuming that the seating capacity of the cars is not a problem, what is the minimum number of cars necessary to take the students to the museum? 3



1: A, E, H
2: B, D, F
3: C, G

3. A scoutmaster is organizing a trip to a nearby lake. From past experience, he knows that certain boys will cause problems if they are together in the same car during the trip. If a car can hold no more than 5 boys, how many cars will be needed to transport the boys? An X indicates that the boys must not travel together in the same car. 2

BOYS	Joe	Pete	Al	Vic	Sal	Rick	Dill	Bill	Carl	Tim
Joe		X		X						
Pete	X		X		X					
Al		X				X				
Vic	X				X					
Sal		X		X		X	X			
Rick			X		X			X		
Dill					X			X	X	
Bill						X	X			X
Carl							X			X
Tim								X	X	

1: Carl, Bill, Sal, Al, Joe
2: Pete, Vic, Rick, Dill, Tim

4. Following is a list of chemicals and the chemicals with which each cannot be stored. How many different storage facilities are necessary? 3

chemical	cannot be stored with
1	2, 5, 7
2	1, 3, 5
3	2, 4
4	3, 7
5	1, 2, 6, 7
6	5
7	1, 4, 5

1: 1, 3
2: 2, 6, 7
3: 4, 5

5. Suppose 12 students serve on 6 different committees. The committees must all meet during HOT lunch. There are only 3 time slots available. Find a schedule that will allow all students to attend the meetings of all committees on which they serve:

School Improvement: Sam, Lisa, Ann, Fred

Green Campus: Greg, Vinny, Fred, India

SADD: Leon, Randy, Peter

Robotics: Jan, Sam, Leon

DECA: Greg, Randy, Vinny, Lisa

Athletics: Vinny, Jan, Bob

1: DECA, Robotics
2: Athletics, School Improv., SADD
3: Green Campus

6. Six students (A, B, C, D, E, and F) must take final exams. Determine a final exam schedule if students can only take one exam a day. What is the fewest number of days needed to schedule all 8 exams? 3

A: English, Science, PE

B: Science, PE, Psychology

C: Math, Psychology, Art

D: English, French, Art

E: PE, Art, Psychology

F: Math, Science, Band

1: Art & Science
2: English, Psychology, Band
3: PE, Math, French

7. Suppose that 10 argumentative relatives are coming to dinner. Some of these family members fight constantly, so they cannot be seated at the same table. Using the smallest number of tables necessary, determine a seating arrangement. All incompatible pairs of relatives are given below.

relative	cannot be seated with:
Tom	Harry, Roseanne, Madonna
Dick	Harry, Roseanne, Mary, Lucrecia
Harry	Tom, Dick, Peter, Mary, Maude
Peter	Harry, Lucrecia
Paul	Roseanne, Madonna, Maude
Mary	Dick, Harry
Maude	Harry, Paul
Roseanne	Tom, Dick, Paul
Madonna	Tom, Paul
Lucrecia	Dick, Peter

1: Harry, Roseanne, Madonna, Lucrecia
2: Tom, Dick, Peter, Maude
3: Paul, Mary

8. Mr. Pittman has decided to offer several new, exciting classes for HSHS students. He does not want to offer 2 different classes at the same time if there are students wanting to take both. He decided to construct a graph in the following way: each class is represented by a vertex & if there is a student interested in two classes, those two vertices are connected by an edge. Suppose there are five classes (A, B, C, D, and E) and only five students wishing to take the following classes:

- Mike wants classes A and E
- Jillian wants to take classes B, C, and E
- Adrianna wants to take classes A and D
- Sarah wants to take classes B and C
- Jason wants to take classes D and E

1: E
2: A & C
3: B & D

Determine a schedule for when the classes will be offered.

9. Our math department has 10 classes which need to be scheduled for the spring semester. Some cannot be scheduled at the same time due to teacher constraints. Determine a schedule using the minimum number of slots.

1: D, I, J
2: A, B, C, G, H
3: E, F

Class	Cannot be scheduled with:
A	D I
B	D I J
C	E F I
D	A B F
E	H I
F	I
G	J
H	E I J
I	A B C E F H
J	B G H

10. Construct your own scheduling problem. Provide a description of the problem situation. Include a listing or chart of incompatible objects. Provide a solution to your problem with all work shown.