Three graph theory problems

Math 40210, Fall 2012

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Assigning radio frequencies

There are ten broadcast towers, each of which are to be assigned a broadcast frequency

Towers within 50km of each other can't get same frequency

How many different frequencies are needed?

Translation to graphs:

1. **Vertices**: radio towers
2. **Edges**: pairs of towers close enough to interfere with each other
3. **Task**: assign broadcast frequencies to vertices, two vertices joined by an edge getting different frequencies, *using as few frequencies as possible*

Scheduling meetings

There are ten senatorial committees, each of which are to be assigned a meeting time

A pair of committees on which the same senator serves can't get same time slot

How many different time slots are needed?

Translation to graphs:

1. **Vertices**: the committees
2. **Edges**: pairs of committees that have a senator in common
3. **Task**: assign time slots to vertices, adjacent vertices getting different time slots, *using as few time slot as possible*

Transporting animals

There are 45 animals that need to be moved from A to B

A pair of animals, one of whom eats the other, can't go into the same cage

How many different cages are needed?

Translation to graphs:

1. **Vertices**: animals being transported
2. **Edges**: pairs of animals, one of whom eats the other
3. **Task**: assign cages to vertices, adjacent vertices getting different cages, *using as few cages as possible*