

Last name _____

First name _____

LARSON—OPER 731—CLASSROOM WORKSHEET—25
Matroids

Matroids

1. *Why*, if you have a set Y of 3 linearly independent vectors in \mathbb{R}^3 and a set X of 2 linearly independent vectors, must it be the case that there is a vector $v \in Y$ such that $X \cup \{v\}$ is linearly independent?
2. What is a *matroid*?
3. What is a *tree*? What is a *spanning tree* in a graph?
4. What can you say about the number of edges in a tree?
5. What is a *forest* in a graph? What is a *component* of a graph? What is κ ? What can you say about the number of edges in a forest?
6. *Why*, if the edges Y of a graph G induce a forest and the edges X of G induce a forest and $|Y| > |X|$, must it be the case that there is an edge $e \in Y$ such that $X \cup \{e\}$ induces a forest in G ?

Checking the Matroid Axioms

7. What is a *linear matroid*?

8. What is a *graphic matroid*?

9. What is a *uniform matroid*?

Even More!

10. What is the (cardinality) *greedy algorithm* for a matroid M ?

11. What is the *matroid intersection theorem*?