

Announcements Feb 12

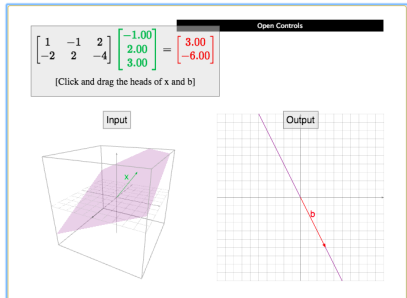
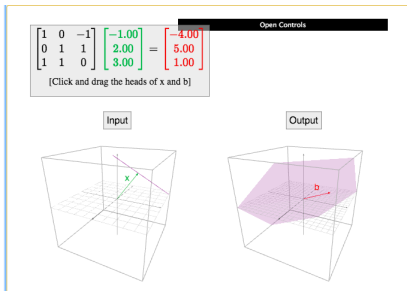
- Midterm 2 on **March 6**
- WeBWorK 2.6 due Thursday
- **My office hours Monday 3-4 and Wed 2-3**
- TA office hours in Skiles 230 (you can go to any of these!)
 - ▶ Isabella Thu 2-3
 - ▶ Kyle Thu 1-3
 - ▶ Kalen Mon/Wed 1-1:50
 - ▶ Sidhanth Tue 10:45-11:45
- PLUS sessions Mon/Wed 6-7 LLC West with Miguel (different this week)
- Supplemental problems and practice exams on the master web site

Section 2.9

The rank theorem

Rank Theorem

On the left are solutions to $Ax = 0$, on the right is $\text{Col}(A)$:



Rank Theorem

$$\text{rank}(A) = \dim \text{Col}(A) = \# \text{ pivot columns}$$

$$\text{nullity}(A) = \dim \text{Nul}(A) = \# \text{ nonpivot columns}$$

$$\text{Rank Theorem. } \text{rank}(A) + \text{nullity}(A) = \# \text{cols}(A)$$

This ties together everything in the whole chapter: rank A describes the b 's so that $Ax = b$ is consistent and the nullity describes the solutions to $Ax = 0$. So more flexibility with b means less flexibility with x , and vice versa.

$$\text{Example. } A = \begin{pmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{pmatrix}$$

Section 2.9 Summary

- **Rank Theorem.** $\text{rank}(A) + \dim \text{Nul}(A) = \#\text{cols}(A)$