12.3-12.5: Recap
Monday, February 8

Warmup
Let $u = (1, 2, 3)$, $v = (-5, 1, 1)$, $w = (-3, 5, 7)$. Find:

1. $u \cdot v$
2. $u \cdot u$
3. $v \times w$
4. $u \cdot (v \times w)$
5. What does the previous answer tell you about $u, v,$ and $w$?
6. Make a sketch of the plane $x + y + z = 1$ in the region $x, y, z \geq 0$.
7. What is the relation between the sets described by $u \cdot x = 1$ and $u \cdot x = 2$?

True or False

1. For any $u, v, w \in \mathbb{R}^3$, $u \cdot (v \times w) = (u \times v) \cdot w$.
2. For any $u, v, w \in \mathbb{R}^3$, $u \times (v \times w) = (u \times v) \times w$.
3. If $u \cdot v = 0$ then $u = 0$ or $v = 0$.
4. If $u \times v = 0$ then $u = 0$ or $v = 0$.
5. The intersection of two non-parallel planes is always a line.
Three Dimensions

Find a formula for the distance from a point $P_0$ to a line of the form $u_0 + tu$. Make a picture first.

Find the set of points equidistant from two parallel lines of the form $u_0 + tu$ and $u_1 + tu$. Make a sketch first and guess what the answer should be before doing any computations.

Bonus: What if the lines intersect? What if they are skew lines?

Given two intersecting planes described by the equations $u \cdot x = k_1$ and $v \cdot x = k_2$, find a way to describe the intersection.