Around the transpose

Let $\vec{x} \in \mathbb{R}^n$, $\vec{y} \in \mathbb{R}^m$, and $A \in M_{m,n}$. Then $A\vec{x} \in \mathbb{R}^m$. The essential property of matrix transpose is that

$$(*) \qquad A\vec{x} \cdot \vec{y} = x \cdot A^T y,$$

which you were asked to derive in Assignment 7. This manipulation with dot product is not exotic; it should become a **standard** one with you.

The calculations from Monday's lecture (Oct 29) were based on (*). They went as they went. When one is considering applied problems, the calculations go as they do, and they won't always come out neat. Still, this calculation followed basic concepts. **There is no reason you have to follow a calculation the instant it is presented to you.** Better, get it down on paper or try to absorb the flow of the argument. It will make more sense after you've had time to think about it.

When I'm doing a long calculation, I almost never get it right the first time around. Sometimes I don't even want to! And I don't like trying to follow someone else's calculation.