TEXTBOOK: Linear Algebra
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READ: Section 1.2, 1.3

PROBLEMS:

1. If $a_1, a_2, \ldots, a_n \in \mathbf{R}$ prove using vector methods that

$$\frac{|a_1 + a_2 + \cdots + a_n|}{\sqrt{n}} \leq \sqrt{a_1^2 + a_2^2 + \cdots + a_n^2}$$

2. Let $\mathbf{u} = [3, 4]$ and $\mathbf{a} = [2, 1]$. Find the projection of $\mathbf{u}$ on $sp(\mathbf{a})$.

3. Find the projection of $\mathbf{u} = [1, 2, 1]$ on the line with parametric equations $x = 3t, y = t, z = 2t$.

4. Let $\mathbf{u} = [-1, 2, 0, 1]$ and $\mathbf{a} = [2, -3, 1, 2]$. Find the projection of $\mathbf{u}$ on $sp(\mathbf{a})$.

5. Find the shortest distance from the point $(0, 2, -3)$ to the line that goes through the points $(1, -1, -2)$, $(2, -2, -2)$.

6. Find the equation of the line through the point $(1, 3)$ and parallel to the vector $[2, -1]$.

7. Find the equation of the line through the points $(1, 3, -4)$ and $(3, 2, 1)$.