Math 54 Worksheet 7
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1. What is the angle between the vectors $(1, 1, 0)$ and $(0, 1, 1)$ in $\mathbb{R}^3$?
2. What is the angle between the vectors $(1, -1, 1, -1)$ and $(0, 1, -1, 1)$ in $\mathbb{R}^4$?
3. Let $\mathbf{v} = (1, -1)$.
   (a) Describe the span in $\mathbb{R}^2$ of the set of all vectors $\mathbf{w}$ such that $\mathbf{v} \cdot \mathbf{w} = 0$.
   (b) Describe the span in $\mathbb{R}^2$ of the set of all vectors $\mathbf{w}$ such that $\mathbf{v} \cdot \mathbf{w} = 1$.
4. The *unit cube* in $\mathbb{R}^n$ is the set of all vectors $(x_1, \ldots, x_n)$ such that $0 \leq x_i \leq 1$ for all i. What is the maximum distance between two points in the unit cube?
5. Can you find vectors $\mathbf{u}$, $\mathbf{v}$ and $\mathbf{w}$ in $\mathbb{R}^3$ such that $\mathbf{u} \cdot \mathbf{v} = 0$ and $\mathbf{v} \cdot \mathbf{w} = 0$, but $\mathbf{u} \cdot \mathbf{w} \neq 0$?