Cones in General

The *cone* in $\mathbb{R}^n$ generated by a collection of vectors $\mathbf{v}_1, \mathbf{v}_2, \mathbf{v}_3, \ldots, \mathbf{v}_k$ is the set of all nonnegative linear combinations of these vectors, drawn in standard position. (A nonnegative linear combination is of the form $\sum_{i=1}^{k} c_i \mathbf{v}_i$, where $c_i \geq 0$, i.e. a linear combination where all of the coefficients are nonnegative.)

1. Cones in $\mathbb{R}^2$ are easy to identify. Shade in the cone generated by $\mathbf{v}_1 = [1, 1]$ and $\mathbf{v}_2 = [2, 0]$.

2. Shade in the cone generated by $\mathbf{v}_1 = [-1, 1]$, $\mathbf{v}_2 = [0, 2]$, and $\mathbf{v}_3 = [1, 1]$.

3. Does the vector $[0, 7, 3]$ belong to the cone generated by $[1, 1, 1]$, $[-1, 2, 1]$, and $[0, -1, 1]$?

4. Does the vector $[0, 7, 3]$ belong to the cone generated by $[1, 1, 1]$, $[-1, 2, 1]$, $[0, -1, 1]$, and $[0, 1, 0]$?