## Exercise 14

Let $\mathbf{v}_{1}=(0,3,0), \mathbf{v}_{2}=(2,2,0), \mathbf{v}_{3}=(1,1,3)$. These three vectors with their tails at the origin determine a parallelepiped $P$.
(a) Draw $P$.
(b) Determine the length of the main diagonal (from the origin to its opposite vertex).

## Solution



To obtain the main diagonal vector, add all the vectors together.

$$
\begin{aligned}
\mathbf{v} & =\mathbf{v}_{1}+\mathbf{v}_{2}+\mathbf{v}_{3} \\
& =(0,3,0)+(2,2,0)+(1,1,3) \\
& =(0+2+1,3+2+1,0+0+3) \\
& =(3,6,3)
\end{aligned}
$$

Calculate the magnitude of $\mathbf{v}$ to get its length.

$$
\begin{aligned}
\|\mathbf{v}\| & =\sqrt{3^{2}+6^{2}+3^{2}} \\
& =\sqrt{54} \\
& \approx 7.35
\end{aligned}
$$

