## 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.

$$\mathbf{v} = \mathbf{v}_1 + \mathbf{v}_2 + \mathbf{v}_3$$
  
= (0,3,0) + (2,2,0) + (1,1,3)  
= (0+2+1,3+2+1,0+0+3)  
= (3,6,3)

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

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

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