

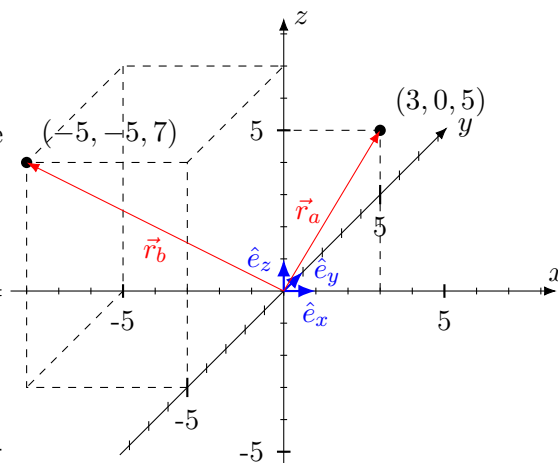
## POSITION VECTOR

If you are able to solve these problems on your own, then you can assume that you have the minimum knowledge about these topics.

The problems marked with (\*) have additional difficulties. Don't hesitate about seeking help from teachers and your classmates if you are not able to complete them.

## 1. Addition of positions

- Save in a variable called `a_r` a vector that indicates the position  $\vec{r}_a = 3\hat{e}_x + 0\hat{e}_y + 5\hat{e}_z$ .
- Save  $\vec{r}_b = -5\hat{e}_x + (-5)\hat{e}_y + 7\hat{e}_z$  in `b_r`.
- Subtract the corresponding variables to find  $\Delta\vec{r}_{a \rightarrow b} = \vec{r}_b - \vec{r}_a$  and save the result in `ab_deltaR`.
- Save in `c_r` the result from  $\vec{r}_a + \Delta\vec{r}_{a \rightarrow b}$ .
- To verify that you did a good work, it's sufficient to display `c_r` and check that  $\vec{r}_c = \vec{r}_b$ .



## 2. (\*) Position as a function of a variable

A particle of mass  $m$  is attached to a ring of radius  $R$ , and therefore its radius measured from the center of the ring is constant. Then it's enough to know the angle  $\varphi$  to describe its position.

- Write it using cartesian coordinates.
- Calculate the velocity of this particle.

