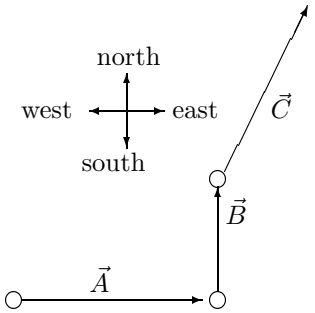
10. We label the displacement vectors $\vec{A}$, $\vec{B}$ and $\vec{C}$ (and denote the result of their vector sum as $\vec{r}$). We choose *east* as the $\hat{\imath}$ direction ($+x$ direction) and *north* as the $\hat{\jmath}$ direction ($+y$ direction). All distances are understood to be in kilometers. We note that the angle between $\vec{C}$ and the x axis is $60°$. Thus,



$$\begin{aligned} \vec{A} &= 50\ \hat{\imath} \\ \vec{B} &= 30\ \hat{\jmath} \\ \vec{C} &= 25\cos(60°)\ \hat{\imath} + 25\sin(60°)\ \hat{\jmath} \\ \vec{r} = \vec{A} + \vec{B} + \vec{C} &= 62.50\ \hat{\imath} + 51.65\ \hat{\jmath} \end{aligned}$$

which means that its magnitude is

$$|\vec{r}| = \sqrt{62.50^2 + 51.65^2} \approx 81 \text{ km} .$$

and its angle (counterclockwise from $+x$ axis) is $\tan^{-1}(51.65/62.50) \approx 40°$, which is to say that it points $40°$ *north of east*. Although the resultant $\vec{r}$ is shown in our sketch, it would be a direct line from the "tail" of $\vec{A}$ to the "head" of $\vec{C}$.