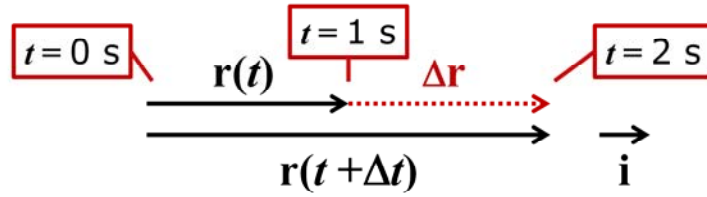


Time Derivative of a Vector: Exercise

Magnitude changes, but direction constant



$$\mathbf{v} = \frac{d\mathbf{r}}{dt} = \dot{\mathbf{r}} = 2 \mathbf{i}$$

$$\mathbf{r}(t) = 2t \mathbf{i}$$

$$\Delta \mathbf{r} = (4 - 2) \mathbf{i} = 2 \mathbf{i}$$

\mathbf{v} has

direction of $\Delta \mathbf{r}$

and magnitude $|\Delta \mathbf{r} / \Delta t|$

$$\left| \frac{\Delta \mathbf{r}}{\Delta t} \right| = \left| \frac{(4 - 2) \mathbf{i}}{(2 - 1)} \right| = \left| \frac{2 \mathbf{i}}{1} \right| = 2$$