

Find $\vec{r}(t)$ in each of the following problems.

1)

$$\vec{v}(t) = \begin{pmatrix} 1/t \\ t \\ 1/2t \end{pmatrix}, \quad \vec{r}(0) = \begin{pmatrix} 0 \\ 1 \\ -1 \end{pmatrix}.$$

2)

$$\vec{v}(t) = \begin{pmatrix} \cos(t) \\ e^{-t} \\ \sin(t) \end{pmatrix}, \quad \vec{r}(0) = \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix}.$$

3)

$$\vec{v}(t) = \begin{pmatrix} e^{2t} \\ t - e^t \\ t^2 \end{pmatrix}, \quad \vec{r}(0) = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}.$$