

演習問題 1 解答例

[1]

$$\begin{aligned}\vec{r}(t) &= (-4t + 3, 2t + 5, -5t^2 + 3t + 2), \\ \vec{v}(t) &= \frac{d\vec{r}(t)}{dt} = (-4, 2, -10t + 3), \\ \vec{a}(t) &= \frac{d\vec{v}(t)}{dt} = (0, 0, -10).\end{aligned}$$

[2]

$$\begin{aligned}\vec{v}(t) &= (0, 5, -10t + 2), \\ \vec{a}(t) &= \frac{d\vec{v}(t)}{dt} = (0, 0, -10), \\ \vec{r}(t) &= \vec{r}_0 + \int_0^t \vec{v}(s) ds \\ &= (0, -5, 0) + \int_0^t (0, 5, -10s + 2) ds \\ &= (0, -5, 0) + (0, 5t, -5t^2 + 2t) \\ &= (0, 5t - 5, -5t^2 + 2t).\end{aligned}$$

[3]

$$\begin{aligned}\vec{a}(t) &= (0, 0, -10), \\ \vec{v}(t) &= \vec{v}_0 + \int_0^t \vec{a}(s) ds \\ &= (5, 0, 0) + \int_0^t (0, 0, -10) ds \\ &= (5, 0, 0) + (0, 0, -10t) \\ &= (5, 0, -10t). \\ \vec{r}(t) &= \vec{v}_0 + \int_0^t \vec{v}(s) ds \\ &= (0, 0, 100) + \int_0^t (5, 0, -10s) ds \\ &= (0, 0, 100) + (5t, 0, -5t^2) \\ &= (5t, 0, 100 - 5t^2).\end{aligned}$$