Chapter 4 Problem 91 [†]

Given
$\vec{v}(t) = 250.0\ \hat{i}\ m/s$
$\vec{a}(t) = (3.0\ \hat{i} + 4.0\ \hat{j})\ m/s^2$

Solution
What is the velocity 5 s after the rockets fire?

Although the acceleration is a vector, it is constant. Therefore, the vector form of the kinematic equations apply. Using the first kinematic equation gives

$$\vec{v}_f = \vec{v}_0 + \vec{a}t$$

$$\vec{v}_f = (250.0\ \hat{i}\ m/s) + (\{3.0\ \hat{i} + 4.0\ \hat{j}\}\ m/s^2)(5.0\ s)$$
$$\vec{v}_f = (250.0\ \hat{i}\ m/s) + \{15.0\ \hat{i} + 20.0\ \hat{j}\}\ m/s$$
$$\vec{v}_f = \{265.0\ \hat{i} + 20.0\ \hat{j}\}\ m/s$$

[†]Problem from University Physics by Ling, Sanny and Moebs (OpenStax)