14.7: Examples

Whiteboard Problem 14.7.1: A Pair of Vector Problems

Position to Velocity:

An object's position as a function of time is given by

$$\vec{r}(t) = \frac{c}{bt+1}\hat{x} + cbt\hat{y} + at^2\hat{z}, \tag{14.7.1}$$

where a, b, and c are constants.

1. What are the SI units of a, b, and c?
2. Find an expression of the object's *speed* as a function of time.

Velocity to Acceleration:

An object's velocity as a function of time has components

$$v_x(t) = bt^2 + c \tag{14.7.2}$$

$$v_y(t) = qt \tag{14.7.3}$$

$$v_z(t) = 0, \tag{14.7.4}$$

where $b = 10$ m/s^3, $c = 5$ m/s, and $q = -2.0$ m/s^2.

1. What is the magnitude of the object's acceleration at $t = 0$?
2. What about at $t = 3.0$ s?