

# Rectilinear Motion and Integration

## Rectilinear Motion and the Indefinite Integral

### Example 1.

A particle moves in a straight line and has acceleration given by  $a(t) = 6t + 4$ . Its initial velocity is  $v(0) = -6$  cm/s and its initial displacement is  $s(0) = 9$  cm. Find its position function  $s(t)$ .

**Example 2.**

A ball is thrown upward with a speed of 48 ft/s from the edge of a cliff 432 ft above the ground.

1. Find its height above the ground  $t$  seconds later.

2. When does it reach its maximum height?

3. When does it hit the ground?

## Rectilinear Motion and the Definite Integral

### Example 3.

A particle moves along a line so that its velocity at time  $t$  is

$$v(t) = t^2 - t - 6 \quad (\text{measured in } m/s).$$

1. Find the displacement of the particle during the time period  $1 \leq t \leq 4$ .

2. Find the distance traveled during this time period.