Velocity and Displacement

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If $r : [t_0, t_1] \to \mathbb{R}$ describes the position of a particle in an interval of time $[t_1, t_1]$, and if the velocity is defined by $v(t) = r'(t)$, how can we relate the total displacement of the particle to the velocity? The total dispacement is $\Delta r = r(t_1) - r(t_0)$.

The acceleration of gravity on the surface of the Earth is roughly -9.81 meters per second per second. Let's round this to -10 meters per second per second. The position of a particle that is dropped from 5 meters is then:

$$r(t) = -5t^2 + 5 \tag{1}$$

The velocity of the particle is the derivative with respect to time.

$$v(t) = -10t \tag{2}$$

Split the interval $[0, 1]$ into a partition and numerically integrate the following:

$$D = \int_0^1 v(t)\ \mathrm{d}t \tag{3}$$

1. What physical quantity does D represent?
2. Numerically, what value did you get for the integral?
3. Compare this with $r(1) - r(0)$. What can you conclude?