1 calculate velocity from acceleration

Given:
current Time: T
start Time: T_0

Velocity: $a(t)$
$a(T_0) = 0$

We know:
$a = \dot{v}$
we need to calculate

$$v = \int_{T_0=0}^{T} a(t)\ dt \tag{1}$$

(1) corresponds to the area below a graph from $T_0 = 0$ to .
Assumtion: time intervalls are short enough to aproximate the acceleration linear
Time at the i-th timestep: T_i
Acceleration at the i-th timestep: $a(T_i)$
To calculate the velocity after n timesteps we need to evaluate:

$$v(n) = \sum_{i=1}^{n} \frac{1}{2}(a(T_{i-1}) + a(T_i)) \cdot (T_i - T_{i-1}) \tag{2}$$

Assumtion: time intervalls are short enough to aproximate the acceleration constant

$$v(n) = \sum_{i=1}^{n} a(T_i) \cdot (T_i - T_{i-1}) \tag{3}$$

(2) and (3) can be calculated step by step. As we want to know the speed at any time anyway, we only need to calculate one summand at once and add it to the old velocity.