

8. Average velocity over  $[t - k, t + k]$  is

$$\begin{aligned} & \frac{3(t + k)^2 - 12(t + k) + 1 - [3(t - k)^2 - 12(t - k) + 1]}{(t + k) - (t - k)} \\ &= \frac{1}{2k} (3t^2 + 6tk + 3k^2 - 12t - 12k + 1 - 3t^2 + 6tk - 3k^2 \\ & \quad + 12t - 12k + 1) \\ &= \frac{12tk - 24k}{2k} = 6t - 12 \text{ m/s}, \end{aligned}$$

which is the velocity at time  $t$  from Exercise 7.