**Problem statement** A charged particle moves along the $x$-axis under the influence of an electric field. The field strength varies with time, and as a result the velocity of the particle is complicated. The position of the particle at time $t$ is written as $x = x(t)$ and the velocity of the particle at time $t$ is written as $v = v(t)$.

Suppose we know that $x(0) = 0$, and also that

$$v(t) = \begin{cases} 
2t - 1, & \text{if } 0 \leq t \leq 1 \\
4t - 3, & \text{if } 1 \leq t \leq 2 \\
6t - 7, & \text{if } 2 \leq t \leq 3
\end{cases}$$

What is $x(1)$? What is $x(2)$? What is $x(3)$? Sketch the graphs of $x = x(t)$ and $v = v(t)$. 