DLN 1.3.4

$\dot{V} = k V^{2/3}$ + $V(0) = 0$. $\Rightarrow$ $V^{-2/3} dV = k\,dt$ $\Rightarrow$

$3V^{1/3} = k(t-\tau)$ $\Rightarrow$ $V = [k/3\,(t-\tau)]^3$. Note that

$\dot{V}(t)\Big|_{t=\tau} = 3\,[k/3\,(t-\tau)]^2 (k/3)\Big|_{t=\tau} = 0$. Also, $V(0) \equiv 0$

is also a solution. Therefore these solutions can be joined at $t=\tau$ to produce the solution

$$V(t) = 0 \;, \quad -\infty \le t \le \tau \qquad \tau \geq 0$$

$$= [(k/3)(t-\tau)]^3 \;, \quad t \ge \tau .$$

which obviously satisfies the initial condition $V(0)=0$

The lack of uniqueness is caused by $f = kV^{2/3}$ and $\frac{\partial f}{\partial V}$ being singular at $V=0 = V(0)$.