$$\begin{aligned}\mathbf{a}\times\mathbf{b} &= \begin{vmatrix} \mathbf{i} & \mathbf{j} & \mathbf{k} \\ t & t^2 & t^3 \\ 1 & 7t & 9t^2 \end{vmatrix} = \begin{vmatrix} t^2 & t^3 \\ 7t & 9t^2 \end{vmatrix}\mathbf{i} - \begin{vmatrix} t & t^3 \\ 1 & 9t^2 \end{vmatrix}\mathbf{j} + \begin{vmatrix} t & t^2 \\ 1 & 7t \end{vmatrix}\mathbf{k} \\ &= (9t^4 - 7t^4)\,\mathbf{i} - (9t^3 - t^3)\,\mathbf{j} + (7t^2 - t^2)\,\mathbf{k} = 2t^4\,\mathbf{i} - 8t^3\,\mathbf{j} + 6t^2\,\mathbf{k}\end{aligned}$$