

13.3 #47

prove

$$\frac{d\vec{T}}{ds} = k\vec{N}$$

$$\begin{aligned} k\vec{N} &= \left| \frac{d\vec{T}}{ds} \right| \vec{N} \\ &= \left| \frac{d\vec{T}}{ds} \right| \frac{\vec{T}'(t)}{|\vec{T}'(t)|} \\ &= \left| \frac{d\vec{T}}{ds} \right| \frac{\frac{d\vec{T}/dt}{dt/ds}}{\left| \frac{d\vec{T}/dt}{dt/ds} \right|} \\ &= \left| \frac{d\vec{T}}{ds} \right| \frac{\frac{d\vec{T}}{ds}}{\left| \frac{d\vec{T}}{ds} \right|} \\ &= \frac{d\vec{T}}{ds} \end{aligned}$$

chain rule.