

$$6. \text{ (cont.)} \quad f = 1$$

$$\vec{T}'(t) = \frac{50}{(4t^2 + 25)^{3/2}} \vec{i} + \frac{-20t}{(4t^2 + 25)^{3/2}} \vec{j}$$

$$\begin{aligned} \vec{T}'(1) &= \frac{50}{(4 \cdot 1^2 + 25)^{3/2}} \vec{i} + \frac{-20(1)}{(4 \cdot 1^2 + 25)^{3/2}} \vec{j} \\ &= \frac{50}{29^{3/2}} \vec{i} + \frac{-20}{29^{3/2}} \vec{j} \end{aligned}$$

$$\|\vec{T}'(1)\| = \sqrt{\left(\frac{50}{29^{3/2}}\right)^2 + \left(\frac{-20}{29^{3/2}}\right)^2}$$

$$= \sqrt{\frac{50^2}{(29^{3/2})^2} + \frac{(-20)^2}{(29^{3/2})^2}}$$

$$= \sqrt{\frac{50^2 + (-20)^2}{(29^{3/2})^2}}$$

$$= \frac{\sqrt{50^2 + (-20)^2}}{\sqrt{(29^{3/2})^2}}$$

$$= \frac{\sqrt{2500 + 400}}{29^{3/2}}$$

$$= \frac{\sqrt{2900}}{\sqrt{29^3}}$$

$$= \frac{\sqrt{29 \cdot 100}}{29 \sqrt{29}}$$

$$\begin{aligned} \|\vec{T}'(1)\| &= \frac{10 \sqrt{29}}{29 \sqrt{29}} \\ &= \frac{10}{29} \end{aligned}$$

$$K = \frac{\|\vec{T}'(1)\|}{\|\vec{T}'(1)\|}$$

$$= \frac{10}{29}$$

$$= \frac{10}{29 \sqrt{29}}$$

$$= \boxed{\frac{10 \sqrt{29}}{29^2}}$$