

$$\begin{aligned}\mathbf{r}(t) &= 5t^2 \mathbf{i} + 7t \mathbf{k} \quad \Rightarrow \quad \mathbf{r}'(t) = 10t \mathbf{i} + 7\mathbf{k}, \quad \mathbf{r}''(t) = 10 \mathbf{i}, \\ |\mathbf{r}'(t)| &= \sqrt{(10t)^2 + 0^2 + 7^2} = \sqrt{100t^2 + 49}, \quad \mathbf{r}'(t) \times \mathbf{r}''(t) = 70 \mathbf{j}, \\ |\mathbf{r}'(t) \times \mathbf{r}''(t)| &= 70. \\ \text{Then } \kappa(t) &= \frac{|\mathbf{r}'(t) \times \mathbf{r}''(t)|}{|\mathbf{r}'(t)|^3} = \frac{70}{(\sqrt{100t^2 + 49})^3} = \frac{70}{(100t^2 + 49)^{3/2}}.\end{aligned}$$