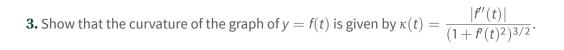
Math 143 Quiz 5

1. Let **a** and **v** be fixed vectors. Parameterize the line $\mathbf{r}(t) = \mathbf{a} + t\mathbf{v}$ by arclength.

2. Suppose $\bf r$ is a vector valued function such that $|\bf r|=1$, meaning that $\bf r\cdot r=1$. Differentiate both sides of this identity to show that $\bf r$ and $\bf r'$ are orthogonal. Why does this mean that $\bf T$ and $\bf N$ are orthogonal?



4. Suppose **r** is parameterized by arclength, meaning that $\kappa = |\mathbf{r}''|$. Show that if $\kappa = 0$, then **r** is a line.

5 (Bonus!). Try on a separate page if done with all other problems: Explain why $\kappa(t) = |\mathbf{r}' \times \mathbf{r}''|/|\mathbf{r}'|^3$.