Math 143 Quiz 5

Names: _____

1. Show that the curvature of the graph of $y = f(t)$ is given by $\kappa(t) = \dfrac{|f''(t)|}{(1 + f'(t)^2)^{3/2}}$.

Hint: Use $\kappa(t) = |\mathbf{r}'(t) \times \mathbf{r}''(t)| / |\mathbf{r}'(t)|^3$.

2. Suppose $\mathbf{r}$ is parameterized by arclength, meaning that $\kappa = |\mathbf{r}''|$. Show that if $\kappa = 0$, then $\mathbf{r}$ is a line.
Hint: Integrate $\mathbf{r}''$ two times to find $\mathbf{r}$.

3. Parameterize the line that passes through the point (a, b, c) and is parallel to the vector $\mathbf{v}$ by arclength.

4. Show that $\mathbf{B}' \cdot \mathbf{T}$ is equal to 0 . Then, by differentiating $\mathbf{B} \cdot \mathbf{B} = 1$, show that $\mathbf{B}' \cdot \mathbf{B}$ is also equal to 0. Why does this imply that $\mathbf{B}'$ and $\mathbf{N}$ are parallel?