1. Prepquiz 1 B

**Problem 1:** Consider the curve in the plane given by the motion

\[ \vec{r}(t) = \langle t, \frac{2}{3} t^{3/2} \rangle, \quad 0 \leq t \leq 1. \]

a) Compute the length parametrization \( s(t) \), i.e., the length of the piece of the curve between \( \vec{r}(0) \) and \( \vec{r}(t) \).

b) Compute the length \( L \) of the curve.

c) Compute the inverse function \( t(s) \) and find an expression for the curve in terms of the length parametrization. Compute the unit tangent vector and the curvature in this parametrization.

**Problem 2:** Find the unit tangent and curvature of the curve described by the motion

\[ \vec{r}(t) = \frac{1}{2} t^2 \hat{i} + \frac{1}{3} t^3 \hat{j} + t \hat{k}. \]

**Problem 3:** Find the normal and tangential component of the acceleration of the motion

\[ \vec{r}(t) = 3t^2 \hat{i} + 4t^2 \hat{j} + 5t \hat{k}. \]