

## 1. PREPQUIZ 1 B

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

$$\vec{r}(t) = \left\langle t, \frac{2}{3}t^{3/2} \right\rangle, 0 \leq t \leq 1 .$$

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

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

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

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