Homework 3

(Total 20 pts; Due Oct. 13 12pm)

QUESTION 1. (**10 pts**) Let $\gamma(t) = (t, t^2, t^3)$. Calculate $T(0), N(0), B(0), \kappa(0), \tau(0)$.

QUESTION 2. (5 PTS) Let γ be a curve such that its osculating planes (the plane passing $p \in \gamma$ and spanned by $T(p)$ and $N(p)$) passes a fixed point. Prove that γ is a planar curve.

QUESTION 3. (5 PTS) Prove that the two curves

$$\gamma(t) = \left(t + \sqrt{3}\sin t, 2\cos t, \sqrt{3}\,t - \sin t\right) \text{ and } \tilde{\gamma}(u) = \left(2\cos\frac{u}{2}, 2\sin\frac{u}{2}, -u\right) \tag{1}$$

are congruent, that is there is a rigit motion M such that γ and $M\tilde{\gamma}$ coincide.