234 Quiz 3

Section: *Name:*

18 minutes. The extra $6 + 6 - 10 = 2$ *points are for bonus.*

1. (6) Let $\vec{x}(t) = \begin{pmatrix} t^2 \\ t \end{pmatrix}$. Compute the curvature κ and the unit normal vector $\vec{N}$. (Hint: you may want to use $\|\lambda\vec{a}\| = |\lambda|\|\vec{a}\|$)
   (To check: the curvature vector you may get is $\vec{\kappa} = \frac{2}{(1+4t^2)^2}\begin{pmatrix} 1 \\ -2t \end{pmatrix}$)

2. (6) Let $\vec{x}(t) = \begin{pmatrix} t^2\cos t \\ t^2 \sin t \\ t^2 \end{pmatrix}$ where $t \geq 0$. Compute the acceleration at $t = 0$ and the arclength of the portion from $t = 0$ to $t = 1$.