Math 2551 Worksheet Section 13.5

1. Write $\vec{a}$ in the form of $\vec{a} = a_T\vec{T} + a_N\vec{N}$ without finding $\vec{T}$ and $\vec{N}$ for $\vec{r}(t) = \langle a\sin t, a\cos t, bt\rangle$.

2. Find $\vec{T}$, $\vec{N}$, $\vec{B}$, κ, and τ for

   (a) $\vec{r}(t) = (3\sin(2t))\hat{i} - (3\cos(2t))\hat{j} + 2t\hat{k}$.

   (b) $\vec{r}(t) = (a\sin t)\hat{i} + (a\cos t)\hat{j} + bt\hat{k}$.

3. Find the equations for the osculating, normal, and rectifying planes at the given value of t.

   (a) $\vec{r}(t) = (e^t \cos(t))\hat{i} + (e^t \sin(t))\hat{j} + 2\hat{k}$, $t = 0$.

   (b) $\vec{r}(t) = t^2\hat{i} + (t^3 - 1)\hat{j} + e^t\hat{k}$, $t = 0$.