

$$13. \vec{r}(t) = 5t\vec{i} + 4t\vec{j} - 2t\vec{k}, \quad t=2$$

$$\vec{r}'(t) = 5\vec{i} + 4\vec{j} - 2\vec{k} \quad \vec{r}'(2) = 5\vec{i} + 4\vec{j} - 2\vec{k}$$

$$\vec{a} = \vec{r}'' = \vec{0}$$

$$\|\vec{r}'(2)\| = \sqrt{5^2 + 4^2 + (-2)^2}$$

$$= \sqrt{25 + 16 + 4}$$

$$= \sqrt{45}$$

$$= 3\sqrt{5}$$

$$\vec{a}(2) = \vec{0}$$

$$a_T = \vec{a}(2) \cdot \vec{T}(2)$$

$$= \vec{0} \cdot \underline{\hspace{2cm}}$$

$$= 0$$

$$\vec{T}(2) = \frac{\vec{r}'(2)}{\|\vec{r}'(2)\|} = \frac{5\vec{i} + 4\vec{j} - 2\vec{k}}{3\sqrt{5}}$$

$$= \frac{5}{3\sqrt{5}}\vec{i} + \frac{4}{3\sqrt{5}}\vec{j} - \frac{2}{3\sqrt{5}}\vec{k}$$

$$= \frac{5\sqrt{5}}{15}\vec{i} + \frac{4\sqrt{5}}{15}\vec{j} - \frac{2\sqrt{5}}{15}\vec{k}$$

$$= \left( \frac{\sqrt{5}}{3}\vec{i} + \frac{4\sqrt{5}}{15}\vec{j} - \frac{2\sqrt{5}}{15}\vec{k} \right)$$

$$a_N = \sqrt{\|\vec{a}\|^2 - a_T^2}$$

$$= \sqrt{0^2 - 0^2}$$

$$= 0$$

$$\vec{a}(t) = a_T \vec{T} + a_N \vec{N}$$

$$\vec{0} = 0 \left( \frac{\sqrt{5}}{3}\vec{i} + \frac{4\sqrt{5}}{15}\vec{j} - \frac{2\sqrt{5}}{15}\vec{k} \right) + 0 \vec{N}$$

$$\vec{0} = \vec{0} + 0(\vec{N})$$

$$\underline{\hspace{2cm}} = \vec{N}$$

so no  $\vec{N}$