

Math 2551 Worksheet Section 13.3

1. Given $\vec{r}(t) = (6 \sin 2t)\hat{i} + (6 \cos 2t)\hat{j} + 5t\hat{k}$, $0 \leq t \leq \pi$,
 - (a) find the unit tangent vector of $\vec{r}(t)$.
 - (b) find the length of the indicated portion of $\vec{r}(t)$.

2. Find the point on the curve

$$\vec{r}(t) = (5 \sin t)\hat{i} + (5 \cos t)\hat{j} + 12t\hat{k}$$

at a distance 26π units along the curve from the point $(0, 5, 0)$ in the direction of increasing arc length.

3. Given $\vec{r}(t) = (2 \ln(t+1))\hat{i} + (e^{2t} + t)\hat{j} + (\sin^2(t))\hat{k}$, set up the appropriate integral with limits to find the length of the curve from point $A(0, 1, 0)$ to $B(\ln 4, e^2 + 1, \sin^2(1))$.

4. Find the length of the curve

$$\vec{r}(t) = (\sqrt{2}t)\hat{i} + (\sqrt{3}t)\hat{j} + (1-t)\hat{k}$$

from $(0, 0, 1)$ to $(\sqrt{2}, \sqrt{3}, 0)$.