

First Name _____ Last Name _____

Lab 9**Calculate the arc length of the indicated portion of the curve $\mathbf{r}(t)$.**

1) $\mathbf{r}(t) = (7 - 2t)\mathbf{i} + (5 + 6t)\mathbf{j} + (9t - 7)\mathbf{k}, -10 \leq t \leq -3$

A) -143

B) -1573

C) 77

D) 847

2) $\mathbf{r}(t) = (2t \sin t + 2 \cos t)\mathbf{i} + (2t \cos t - 2 \sin t)\mathbf{j}; -1 \leq t \leq 7$

A) 50

B) 96

C) 48

D) 100

3) $\mathbf{r}(t) = 10t^3\mathbf{i} + 11t^3\mathbf{j} + 2t^3\mathbf{k}, -1 \leq t \leq 2$

A) 675

B) 45

C) 2025

D) 135

4) $\mathbf{r}(t) = (6\cos^3 7t)\mathbf{j} + (6\sin^3 7t)\mathbf{k}; \frac{6}{7}\pi \leq t \leq \frac{13}{14}\pi$

A) 18

B) 9

C) 3

D) 0

5) $\mathbf{r}(t) = (e^t \cos t)\mathbf{i} + (e^t \sin t)\mathbf{j} + 5e^t\mathbf{k}, -\ln 2 \leq t \leq 0$

A) $\frac{\sqrt{23}}{4}$

B) $\frac{\sqrt{23}}{2}$

C) $\frac{3\sqrt{3}}{4}$

D) $\frac{3\sqrt{3}}{2}$

6) $\mathbf{r}(t) = (8 + 2t^3)\mathbf{i} + (2t^3 - 2)\mathbf{j} + (5 - t^3)\mathbf{k}, -1 \leq t \leq 2$

A) 63

B) 27

C) 81

D) 21

Find the unit tangent vector $\mathbf{T}$.

7) $\mathbf{r}(t) = (5 + 2 \sin 2t)\mathbf{i} + (5 + 2 \cos 2t)\mathbf{j} + 3t\mathbf{k}$

A) $\mathbf{T} = \frac{4}{5}(\cos 2t)\mathbf{i} - \frac{4}{5}(\sin 2t)\mathbf{j} + \frac{3}{5}\mathbf{k}$

B) $\mathbf{T} = \frac{4}{5}(\cos 2t)\mathbf{i} - \frac{4}{5}(\sin 2t)\mathbf{j}$

C) $\mathbf{T} = (\cos 2t)\mathbf{i} - \sin 2t\mathbf{j}$

D) $\mathbf{T} = (\cos 2t)\mathbf{i} - \sin 2t\mathbf{j} + 3\mathbf{k}$

8) $\mathbf{r}(t) = 12t^7\mathbf{i} - 4t^7\mathbf{j} + 3t^7\mathbf{k}$

A) $\mathbf{T}(t) = \frac{12}{13}\mathbf{i} - \frac{4}{13}\mathbf{j} - \frac{3}{13}\mathbf{k}$

B) $\mathbf{T}(t) = \frac{12}{13}\mathbf{i} - \frac{4}{13}\mathbf{j} + \frac{3}{13}\mathbf{k}$

C) $\mathbf{T}(t) = \frac{12}{13}\mathbf{i} + \frac{4}{13}\mathbf{j} + \frac{3}{13}\mathbf{k}$

D) $\mathbf{T}(t) = \frac{12}{169}\mathbf{i} - \frac{4}{169}\mathbf{j} + \frac{3}{169}\mathbf{k}$

9) $\mathbf{r}(t) = (6t \cos t - 6 \sin t)\mathbf{j} + (6t \sin t + 6 \cos t)\mathbf{k}$

A) $\mathbf{T}(t) = -\frac{1}{6}(\sin t)\mathbf{j} + \frac{1}{6}(\cos t)\mathbf{k}$

B) $\mathbf{T}(t) = (-6 \sin t)\mathbf{j} + (6 \cos t)\mathbf{k}$

C) $\mathbf{T}(t) = (6 \cos t)\mathbf{j} - (6 \sin t)\mathbf{k}$

D) $\mathbf{T}(t) = (-\sin t)\mathbf{j} + (\cos t)\mathbf{k}$

Find the curvature of the curve $\mathbf{r}(t)$.

10) $\mathbf{r}(t) = (10 + 6 \cos 9t)\mathbf{i} - (2 + 6 \sin 9t)\mathbf{j} + 2\mathbf{k}$

A) $\kappa = \frac{3}{2}$

B) $\kappa = \frac{1}{36}$

C) $\kappa = \frac{1}{6}$

D) $\kappa = 6$

11) $\mathbf{r}(t) = (t + 4)\mathbf{i} + 9\mathbf{j} + (\ln(\sec t) + 3)\mathbf{k}$

A) $\kappa = \csc t$

B) $\kappa = \cos t$

C) $\kappa = \sec t$

D) $\kappa = \sin t$

Answer Key

Testname: LAB 9 - 14.4, 14.5

- 1) C
- 2) C
- 3) D
- 4) B
- 5) D
- 6) B
- 7) A
- 8) B
- 9) D
- 10) C
- 11) B