

"QUIZ" for Lecture 5

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E-MAIL SCANNED .pdf OF COMPLETED QUIZ to DrZcalc3@gmail.com (Attachment: q5FirstLast.pdf) ASAP BUT NO LATER THAN Sept. 21, 8:00pm

1, Find the curvature for

$$\begin{aligned}
 \mathbf{r}(t) &= \sin t \mathbf{i} + \cos t \mathbf{j} + t \mathbf{k} \\
 \mathbf{r}(t) &= \langle \sin t, \cos t, t \rangle \\
 \mathbf{r}'(t) &= \langle \cos t, -\sin t, 1 \rangle \\
 \|\mathbf{r}'(t)\| &= \sqrt{(\cos t)^2 + (-\sin t)^2 + 1} = \sqrt{\cos^2 t + \sin^2 t + 1} = \sqrt{2} \\
 \mathbf{T}(t) &= \frac{\mathbf{r}'(t)}{\|\mathbf{r}'(t)\|} = \left\langle \frac{\cos t}{\sqrt{2}}, \frac{-\sin t}{\sqrt{2}}, \frac{1}{\sqrt{2}} \right\rangle \\
 \mathbf{T}(s) &= \left\langle \frac{\cos t}{\sqrt{2}}, -\frac{\sin t}{\sqrt{2}}, \frac{1}{\sqrt{2}} \right\rangle \\
 \|\mathbf{T}'(s)\| &= \sqrt{\left(\frac{-\sin t}{\sqrt{2}}\right)^2 + \left(\frac{-\cos t}{\sqrt{2}}\right)^2 + \left(\frac{0}{\sqrt{2}}\right)^2} = \sqrt{\frac{\sin^2 t}{2} + \frac{\cos^2 t}{2} + 0} = \sqrt{\frac{\sin^2 t + \cos^2 t}{2}} = \sqrt{\frac{1}{2}} = \frac{1}{\sqrt{2}} \\
 \kappa(s) &= \frac{1}{\sqrt{2}}
 \end{aligned}$$

2.: Find the velocity, acceleration, and speed of a particle with the given position function.

$$\begin{aligned}
 \mathbf{r}(t) &= t \mathbf{i} + t^2 \mathbf{j} + 5 \mathbf{k} \\
 \mathbf{r}(t) &= \langle t, t^2, 5 \rangle \\
 \mathbf{r}'(t) &= \langle 1, 2t, 0 \rangle \\
 \mathbf{v}(t) &= \langle 1, 2t, 0 \rangle \\
 \mathbf{r}''(t) &= \langle 0, 2, 0 \rangle \\
 \mathbf{a}(t) &= \langle 0, 2, 0 \rangle \\
 \|\mathbf{v}(t)\| &= \sqrt{1 + 4t^2} \\
 s(t) &= \sqrt{1 + 4t^2}
 \end{aligned}$$