"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

$$\mathbf{r}(t) = \sin t\,\mathbf{i} + \cos t\,\mathbf{j} + t\,\mathbf{k} \quad .$$

$K = \frac{T'(t)}{r'(t)}$

$T(t) = \frac{r'(t)}{|r'(t)|}$

$r'(t) = \langle \cos t, -\sin t, 1 \rangle$

$|r'(t)| = \sqrt{\cos^2 t + \sin^2 t + 1} = \sqrt{2}$

$T(t) = \left\langle \frac{\cos t}{\sqrt{2}}, \frac{-\sin t}{\sqrt{2}}, \frac{1}{\sqrt{2}} \right\rangle$

$T'(t) = \left\langle \frac{-\sin t}{\sqrt{2}}, \frac{-\cos t}{\sqrt{2}}, 0 \right\rangle$

$K_1 = \left\langle \frac{-\tan t}{\sqrt{2}}, \frac{\cot t}{\sqrt{2}}, 0 \right\rangle$

$K = \frac{-\tan t}{\sqrt{2}}\,i + \frac{\cot t}{\sqrt{2}}\,j + 0k$

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

$$\mathbf{r}(t) = t\,\mathbf{i} + t^2\,\mathbf{j} + 5\,\mathbf{k} \quad .$$

$v(t) = r'(t)$

$a = r''(t) = v'(t)$

$\text{Speed} = |v(t)|$

$v(t) = i + 2t\,j + 0k$

$a(t) = 0i + 2j + 0k$

$|v(t)| = \sqrt{1 + 4t^2}$