

"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

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

$$\mathbf{r}'(t) = \cos t \mathbf{i} - \sin t \mathbf{j} + \mathbf{k}$$

$$\mathbf{r}''(t) = -\sin t \mathbf{i} - \cos t \mathbf{j}$$

$$\begin{vmatrix} \mathbf{i} & \mathbf{j} & \mathbf{k} \\ \cos t & -\sin t & 1 \\ -\sin t & -\cos t & 0 \end{vmatrix} = \mathbf{i} \begin{vmatrix} -\sin t & 1 \\ -\cos t & 0 \end{vmatrix} - \mathbf{j} \begin{vmatrix} \cos t & 1 \\ -\sin t & 0 \end{vmatrix} + \mathbf{k} \begin{vmatrix} \cos t & -\sin t \\ -\sin t & -\cos t \end{vmatrix}$$

$$\kappa(t) = \frac{\sqrt{\cos^2 t + \sin^2 t + 1}}{(\sqrt{\cos^2 t + \sin^2 t + 1})^3} = \frac{\sqrt{2}}{(\sqrt{2})^3} = \boxed{\frac{1}{2}}$$

$$\begin{aligned} &= \mathbf{i}(0 + \cos t) - \mathbf{j}(0 + \sin t) + \mathbf{k}(-\cos^2 t - \sin^2 t) \\ &= \mathbf{i}(\cos t) - \mathbf{j}(\sin t) - \mathbf{k} \end{aligned}$$

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

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

$$\text{velocity: } \mathbf{r}'(t) = \mathbf{i} + 2t \mathbf{j}$$

$$\text{acceleration } \mathbf{r}''(t) = 2 \mathbf{j}$$

$$\text{speed} = \sqrt{1 + 4t^2}$$