

"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

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

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

$$r''(t) = \langle -\sin t, -\cos t, 0 \rangle$$

$$K = \frac{|r'(t) \times r''(t)|}{|r'(t)|^3}$$

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

$$K = 1$$

$$r'(t) \times r''(t) = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ \cos t & -\sin t & 1 \\ -\sin t & -\cos t & 0 \end{vmatrix}$$

$$= (0 + \cos t) \hat{i} - (-\sin t) \hat{j} + (-\cos^2 t - \sin^2 t) \hat{k}$$

$$= \cos t \hat{i} + \sin t \hat{j} + (-\cos^2 t - \sin^2 t) \hat{k}$$

$$= \cos t \hat{i} + \sin t \hat{j} - 1 \hat{k}$$

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

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

$$v(t) = r'(t) = \langle 1, 2t, 0 \rangle$$

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

$$a(t) = r''(t) = \langle 0, 2, 0 \rangle$$