

"QUIZ" for Lecture 5

NAME: (print!) Shaun Goda Section: 23

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

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

$$\begin{aligned}
 r'(t) &= \langle \cos t, -\sin t, 1 \rangle \\
 r''(t) &= \langle -\sin t, -\cos t, 0 \rangle \\
 r'(t) \times r''(t) &= \begin{vmatrix} \mathbf{i} & \mathbf{j} & \mathbf{k} \\ \cos(t) & -\sin(t) & 1 \\ -\sin(t) & -\cos(t) & 0 \end{vmatrix} \\
 &= \mathbf{i}(0 + \cos^2(t)) - \mathbf{j}(0 + \sin^2(t)) + \mathbf{k}(-\cos^2(t) - \sin^2(t)) \\
 &= \cos^2(t) \mathbf{i} - \sin^2(t) \mathbf{j} + (-\cos^2(t) - \sin^2(t)) \mathbf{k}
 \end{aligned}$$

$$\left. \begin{array}{l} r'(t) \times r''(t) \\ \| r'(t) \times r''(t) \| \\ \| r'(t) \|^3 \end{array} \right\} = \frac{\sqrt{\cos^2(t) \mathbf{i} + \sin^2(t) \mathbf{j} + (-\cos^2(t) - \sin^2(t)) \mathbf{k}}}{\sqrt{(\cos^2(t) + \sin^2(t))^2 + 1}} = \frac{(-\cos^2(t) - \sin^2(t)) \mathbf{k}}{\sqrt{1 + 1}}$$

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

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

$$V(t) = r'(t) = \mathbf{i} + 2t \mathbf{j} + 0 \mathbf{k} = \langle 1, 2t, 0 \rangle$$

$$a(t) = r''(t) = 0 \mathbf{i} + 2 \mathbf{j} = \langle 0, 2, 0 \rangle$$

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