NAME: (print!) __Krithika Patrachari__   Section: __22__

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

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

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

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

2.: Find the velocity, acceleration, and speed of a particle with the given position function.
$$\mathbf{r}(t) = t\,\mathbf{i} + t^2\,\mathbf{j} + 5\,\mathbf{k} \quad . \quad \langle t, t^2, 5 \rangle$$

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

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

$$s = |v| = |r'(t)| = \sqrt{1^2 + (2t)^2 + 0^2} = \sqrt{1 + 4t^2}$$