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

$r'(t) = \cos t\, i - \sin t\, j + 0k$

$r''(t) = -\sin t\, i - \cos t\, j + 0k$

$|r'(t)| = \sqrt{\cos^2 t - \sin^2 t} = \sqrt{1-0} = 1$

$r'(t) \times r''(t) = 0-0,\ 0-0,\ -1-0 = \langle 0, 0, -1 \rangle$

$|r'(t) \times r''(t)| = \sqrt{1^2} = 1$

$K(t) = \dfrac{|r'(t) \times r''(t)|}{|r'(t)|^3} = \dfrac{1}{1} = \boxed{1}$

$r'(0) = \cos(0) i - \sin(0) j + 0k$
$= 1 - 0 + 0$
$= 1^3 = 1$

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

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

$r(t) = \langle t, t^2, 5 \rangle$

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

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

speed is magnitude of velocity → @ t=0, $r'(t) = \langle 1, 2t, 0 \rangle$

$r'(0) = \langle 1, 0, 0 \rangle$

$|v(0)| = \sqrt{1^2} = \boxed{1}$