24 Exam 3 Fall 2001

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PRINT Your Name:_____

There are 10 problems on 5 pages. Each problem is worth 10 points. SHOW your work. CIRCLE your answer. **NO CALCULATORS! Check your answer whenever possible.** If you want to pick up your exam before Tuesday, write a short note to that effect on the top of this page and I will leave your exam outside my office door, before I go home tonight.

1. Find the equations of the line which contains $P = (1, 2, 3)$ and $Q = (7, 3, 2)$. Check your answer.

$\vec{PQ} = 6\vec{i} + \vec{j} - \vec{k}$ the line is $\begin{cases} x = 1 + 6t \\ y = 2 + t \\ z = 3 - t \end{cases}$

at $t=0$ $x=1, y=2, z=3$. This is P. ✓

at $t=1$ $x=7, y=3, z=2$. This is Q. ✓

2. Find the equations of the line tangent to the curve $\vec{r}(t) = 2t^2\,\vec{i} + 4t^3\,\vec{j} + 6t\,\vec{k}$ at $t = -1$.

The point is $(2, -4, -6)$

$\vec{r}\,'(t) = 4t\,\vec{i} + 12t^2\,\vec{j} + 6\vec{k}$

$\vec{r}\,'(-1) = -4\vec{i} + 12\vec{j} + 6\vec{k}$

The tan. line is $\begin{cases} x = 2 - 4t \\ y = -4 + 12t \\ z = -6 + 6t \end{cases}$