Math 241 Fall 2001 Final

PRINT Your Name:_____

Get your course grade from **TIPS/VIP** late on Tuesday or later.

There are 18 problems on 10 pages. The exam is worth a total of 150 points.

SHOW your work. *CIRCLE* your answer. **NO CALCULATORS!**

1. (8 points) Find the equation of the plane through $(2,1,2)$, $(2,-1,1)$, and $(4,0,0)$. **CHECK YOUR ANSWER!** P= Q= R=

$\vec{PQ} = -2\vec{i} - \vec{k}$

$\vec{PR} = 2\vec{i} - \vec{j} - 2\vec{k}$

$\vec{PQ} \times \vec{PR} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 0 & -2 & -1 \\ 2 & -1 & -2 \end{vmatrix} = 3\vec{i} - 2\vec{j} + 4\vec{k}$

$3(x-4) - 2y + 4z = 0$

$3x - 2y + 4z = 12$

check at P $3\cdot 2 - 2\cdot 1 + 4\cdot 2 = 12$ ✓

at Q $3\cdot 2 - 2(-1) + 4\cdot 1 = 12$ ✓

at R $3\cdot 4 + 0 + 0 = 12$ ✓

2. (8 points) Find the equations of the line through $(1,2,3)$ and $(4,6,1)$. **CHECK YOUR ANSWER!** P= Q=

$\vec{PQ} = 3\vec{i} + 4\vec{j} - 2\vec{k}$

$x = 1 + 3t$

$y = 2 + 4t$

$z = 3 - 2t$

check at $t=0$ $(1,2,3)$ ✓

at $t=1$ $(4,6,1)$ ✓