MATH 213 – QUIZ 2 – 9 FEBRUARY 2006

Answer all of the following questions in the space provided. Show all work as partial credit may be given. Answers without justification, even if they are correct, will earn no credit.

1. (3 pts.) Find parametric equations for the line containing the points $(2, 4, 5)$ and $(1, -1, 3)$.

$P = (2,4,5)$

$Q = (1,-1,3)$

direction vector

$\vec{PQ} = \langle -1, -5, -2 \rangle$

$x = 2 - t$

$y = 4 - 5t$

$z = 5 - 2t$

or $\vec{v}_0 = \langle 2,4,5 \rangle$

$\vec{v}_1 = \langle 1,-1,3 \rangle$

$t\vec{v}_1 + (1-t)\vec{v}_0 = t\langle 1,-1,3 \rangle + (1-t)\langle 2,4,5 \rangle$

$= \langle t+2-2t, -t+4-4t, 3t+5-5t \rangle$

$= \langle 2-t, 4-5t, 5-2t \rangle$

2. (3 pts.) Find the equation of the plane containing the point $(1, 1, -1)$ that is perpendicular to the line given by the parametric equations $x = 3 - 2t$, $y = 2 + 2t$, $z = t$. Put your final answer in the form $Ax + By + Cz = D$.

$\vec{n} = \langle -2, 2, 1 \rangle$

$\therefore \quad -2(x-1) + 2(y-1) + (z+1) = 0$

$-2x + 2 + 2y - 2 + z + 1 = 0$

$-2x + 2y + z = -1$ //

3. (3 pts.) Find parametric equations for the line of intersection of the planes given by $x + y = 2$ and $y + z = 1$. (Hint: To find a point on the line, try setting $y = 0$).

direction vector

$\vec{n}_1 = \vec{i} + \vec{j}$

$\vec{n}_2 = \vec{j} + \vec{k}$

$\vec{n}_1 \times \vec{n}_2 = (\vec{i} + \vec{j}) \times (\vec{j} + \vec{k})$

$= \vec{i} - \vec{j} + \vec{k}$ //

point

if $y = 0$ then $x = 2$ and $z = 1$

$\therefore (2,0,1)$ on the line //

equations:

$x = 2 + t$

$y = -t$

$z = 1 + t$ //

4. (1 pt.) The equation $x^2 + 2y^2 = 3z^2 + 1$ defines a (circle one)

HYPERBOLIC PARABOLOID (HYPERBOLOID (ONE SHEET))

HYPERBOLOID (TWO SHEETS) CYLINDER