

Ver.

Math241 DD6, Quiz 1, Sept 10

Name: Solutions.

Question 1: [5pt] Find an equation of the plane through the points (1, 9, 7), (3, 7, 1) and (1, 9, 9).

Sol)  $\langle 3, 7, 1 \rangle - \langle 1, 9, 7 \rangle = \langle 2, -2, -6 \rangle$   
 $\langle 1, 9, 9 \rangle - \langle 1, 9, 7 \rangle = \langle 0, 0, 2 \rangle$

$$\vec{n} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 2 & -2 & -6 \\ 0 & 0 & 2 \end{vmatrix} = \langle -4, -4, 0 \rangle, \quad P = (1, 9, 7)$$

(or (3, 7, 1)  
or (1, 9, 9))

$$-4(x-1) - 4(y-9) = 0$$

$$x-1 + y-9 = 0$$

$$x + y = 10$$

Note that for  $\vec{n}$ , take any two vectors by subtraction then take cross product of them.

Question 2: [5pt] Reduce the equation

$$x^2 - y^2 - 5z^2 - 2x + 16y + 1 = 0$$

to a standard form, classify the surface and sketch it.

Sol)  $(x-1)^2 - (y-8)^2 + 64 - 5z^2 = 0$  ,

$$(x-1)^2 - (y-8)^2 - 5z^2 = -64$$
 ,

$$-\frac{(x-1)^2}{64} + \frac{(y-8)^2}{64} + \frac{z^2}{64/5} = 1$$
 ,

hyperboloid of one sheet,

