2 Pages! **Quiz 1**, Math 2850-005
9/1/2016 Solutions Name _____

1. Find an equation of the plane through $P_0(2,4,5)$ perpendicular to the line

$$x = 5 + t, \quad y = 1 + 3t, \quad z = 4t$$

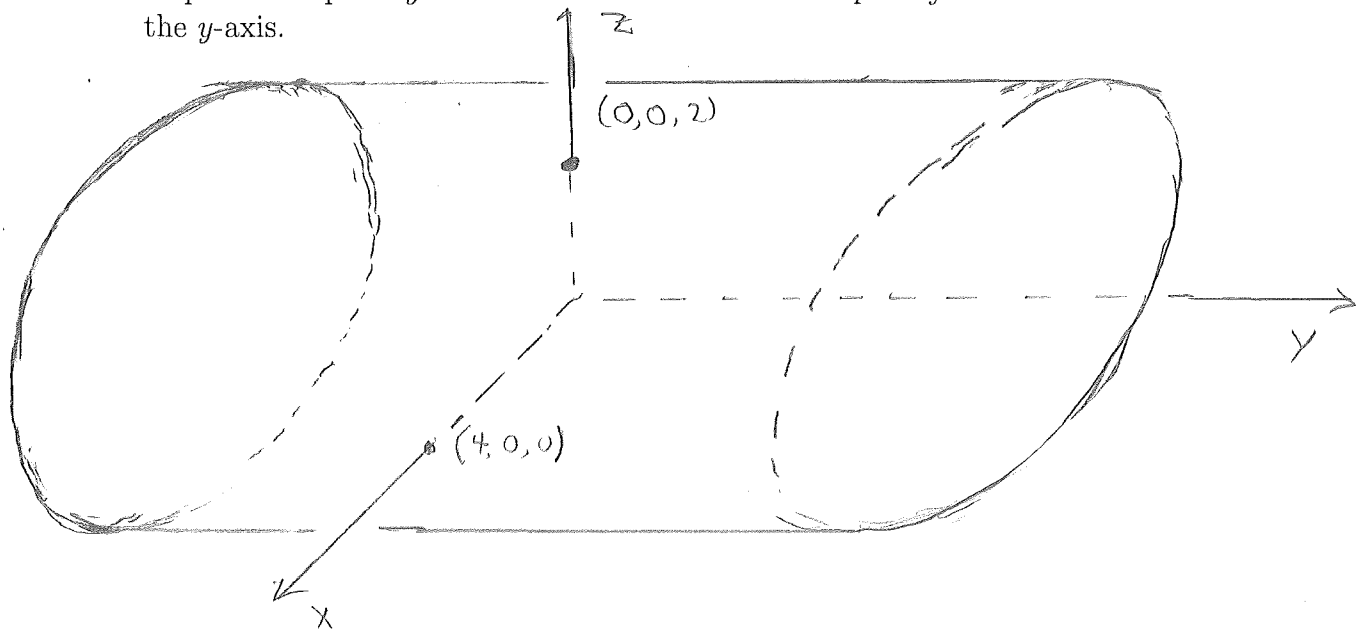
(6)

Here the line has direction vector $\vec{i} + 3\vec{j} + 4\vec{k}$ (from the coefficients of t) and that is perpendicular to the plane and so it can serve as a normal to the plane. The plane is therefore $(x-2) + 3(y-4) + 4(z-5) = 0$ or $x + 3y + 4z = 34$

2. Sketch the surfaces in Parts (a) and (b)

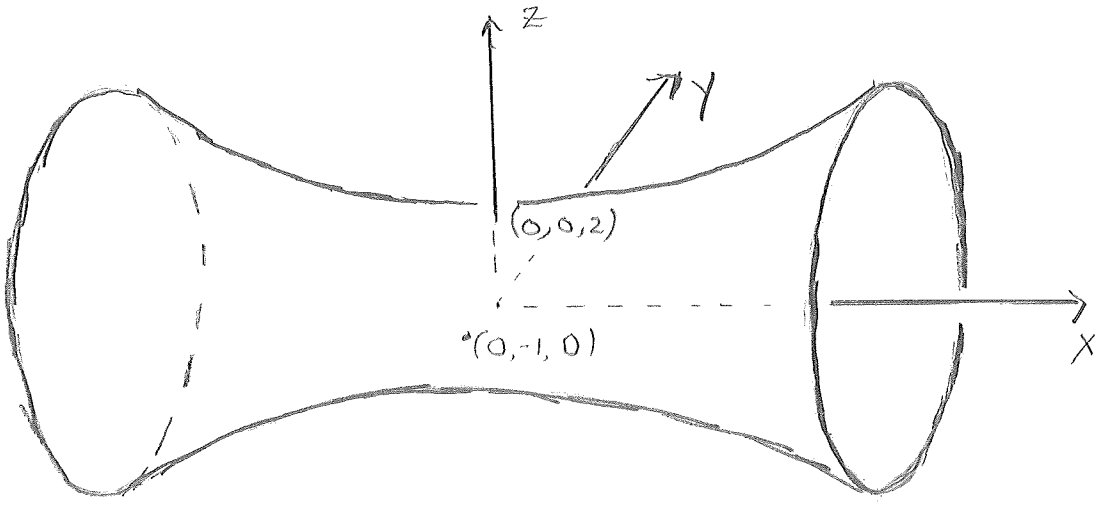
(7) (a) $x^2 + 4z^2 = 16$

There is no y and so this is a cylinder surface. This is the equation of an ellipse in the plane $y = 0$ and so the surface is an elliptic cylinder centered on the y-axis.



(7) (b) $4y^2 + z^2 - 4x^2 = 4$

This is an elliptic hyperboloid of one sheet centered on the x axis.



Note the axes are rotated from the usual but they still obey the right hand rule.