Recognizing quadric surfaces – Math 21A Sug Woo Shin – 10/11

Exercise 0.1. In the first three blank columns, describe the curve that you get when you cut your surface by a plane $x = 0$ (yz-plane), $y = 0$ (xz-plane) or $z = 0$ (xy-plane). Choose answers from:

two lines, parabola, ellipse, hyperbola, a point, nothing.

In the last column, you are asked to figure out what shape the equation represents. Choose answers from:

ellipsoid, elliptic cone, elliptic paraboloid, hyperboloid of one sheet, hyperboloid of two sheets, hyperbolic paraboloid

Equation	cut by $x = 0$	cut by $y = 0$	cut by $z = 0$	What is it?
$\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$				
$\frac{x^2}{a^2} + \frac{y^2}{b^2} - \frac{z^2}{c^2} = 1$				
$\frac{x^2}{a^2} - \frac{y^2}{b^2} - \frac{z^2}{c^2} = 1$				
$\frac{x^2}{a^2} + \frac{y^2}{b^2} = \frac{z^2}{c^2}$				
$\frac{x^2}{a^2} + \frac{y^2}{b^2} = \frac{z}{c}$				
$\frac{x^2}{a^2} - \frac{y^2}{b^2} = \frac{z}{c}$				

Exercise 0.2. (Supplementary questions)

(1) What does the surface given by $x = y^2 - 2z^2$ look like? Can you draw it?

(2) Answer the same question for $x^2 - y^2 + z^2 = -1$.

(3) Answer the same question for $y^2 + z^2 = 1$.

(4) What is the shape of the surface given by $x^2 - y^2 + 2y + z^2 = 0$ (among six possibilities)?