MATH 243: SECTION 12.6 GROUPWORK

(1) Consider the equation $y = x^2$. What region in the 2D plane $\mathbb{R}^2$ does this equation describe? What region in 3D space $\mathbb{R}^3$ does this equation describe? What region in 3D space $\mathbb{R}^3$ is described by the equation $z = y^2$? Sketch graphs of these regions.

(2) Consider the equation $x^2+y^2/4+z^2/9 = 1$. What region in 3D space $\mathbb{R}^3$ does this equation describe? Describe the vertical and horizontal traces of this surface. Sketch a graph of it.

(3) Consider the hyperbolic paraboloid $z = x^2-y^2$. Sketch a graph of the following traces of the surface:
- $x = 0$, $x = 1$, and $x = -1$.
- $z = 0$, $z = 1$, and $z = -1$.
- $y = 0$, $y = 1$, and $y = -1$.