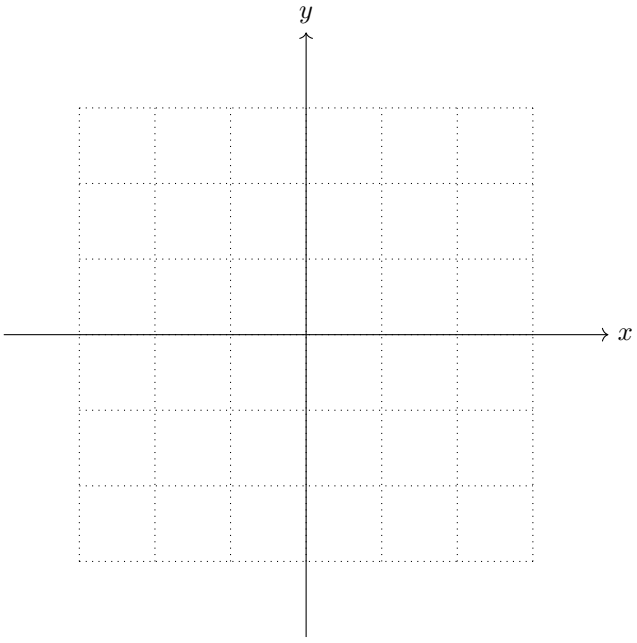
MATH 2E Prep: Level Sets and Surfaces

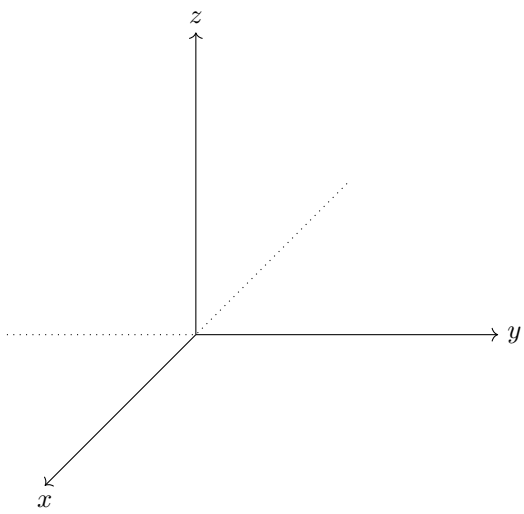
Facts to Know:

1. Level sets of 2-variable functions $f(x, y)$ are:
   - Defined by _____,
   - _____ on the xy-plane,
   - On the graph of _____ in $\mathbb{R}^3$.
2. Level sets of 3-variable functions $g(x, y, z)$ are:
   - Defined by _____,
   - _____ in $\mathbb{R}^3$.

Examples:

1. Sketch the level sets $\dfrac{3}{x^2+y^2+1} = C$ for $C = 3,\ 2,\ 1,\ \dfrac{1}{2}$ on xy-plane, then use the level sets to sketch the graph of $z = \dfrac{3}{x^2+y^2+1}$ in $\mathbb{R}^3$

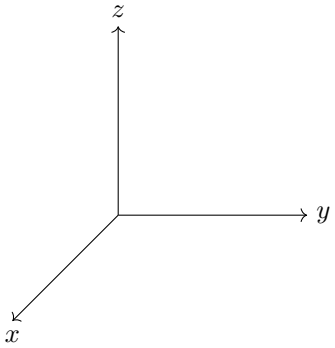




2. Sketch the following level sets in $\mathbb{R}^3$:

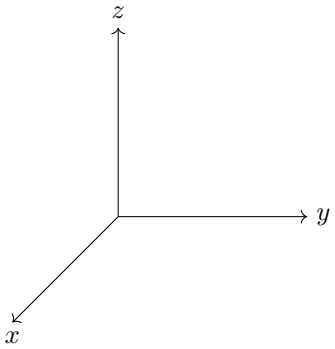
- The Plane $x + y + 2z = 2$

Graph:



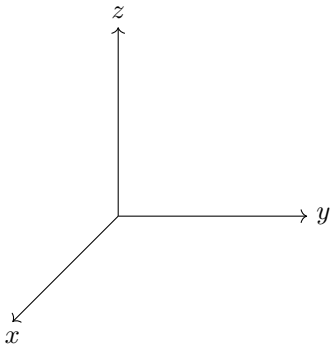
- The Cylinder $y^2 + z^2 = 4$

Graph:



- The Cone $x^2 + y^2 - z^2 = 0$

Graph:



- The Sphere $x^2 + y^2 + z^2 = 1$

Graph: