

More generally: surfaces in $\mathbb{R}^3$ are defined by equations.

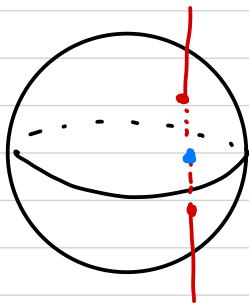
Ex: $7xy + e^{xy} + z = 10 - x^2y$

set of pts (x, y, z) satisfying eqn gives a surface.

Every graph $z = f(x, y)$ is a surface but not vice versa.

$f: \mathbb{R}^2 \rightarrow \mathbb{R}$

Ex. Sphere



doesn't pass vertical line test.

However: every surface that is given by an equation can be thought of as the level surface of some $g: \mathbb{R}^3 \rightarrow \mathbb{R}$.

Ex $7xy + e^{xy} + z - 10 + x^2y = 0$

$g(x, y, z)$

$k = 0$



Important class of examples: Quadric Surfaces

↳ can draw these w/ cross-sections.