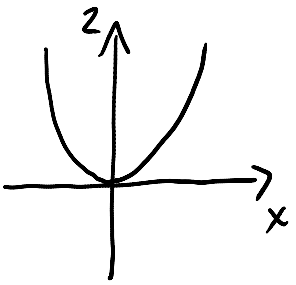
Section 29.2: Curves and Surfaces in 3D

January-23-17
1:30 PM

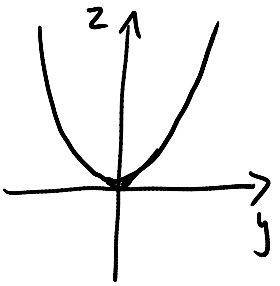
okay, so what does $f(x, y) = x^2 + y^2$ look like?

$$z = x^2 + y^2 \quad \Leftarrow \text{3D graph}$$

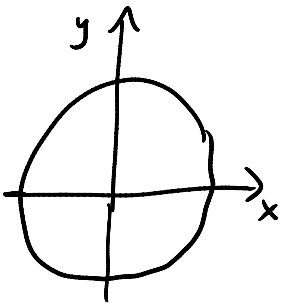
let $y = 0$



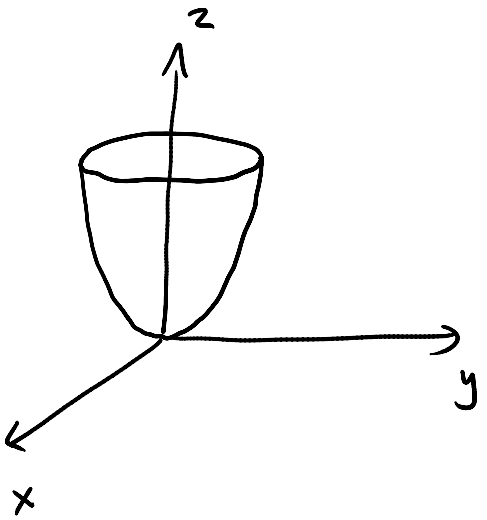
let $x = 0$



let $z =$ positive constant



so:



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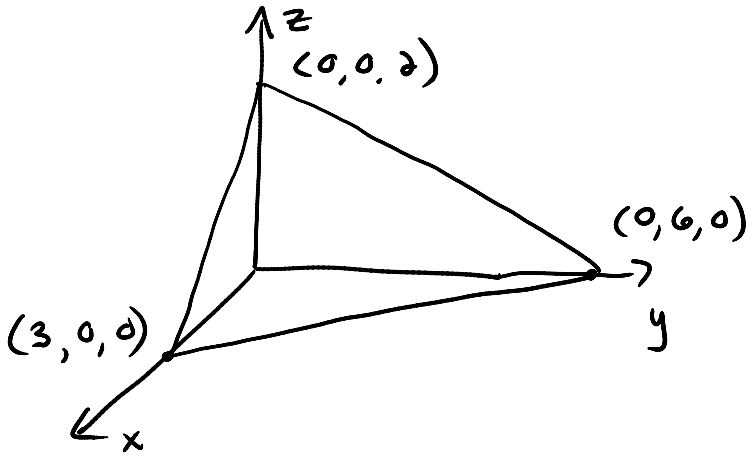
what about $ax + by + cz = d$, where $a, b, c,$ and d are constants?

it's a plane

example: sketch $2x + y + 3z = 6$

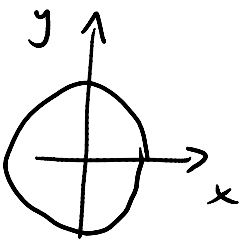


note: this triangle is the shape of the surface of the equation in the first octant

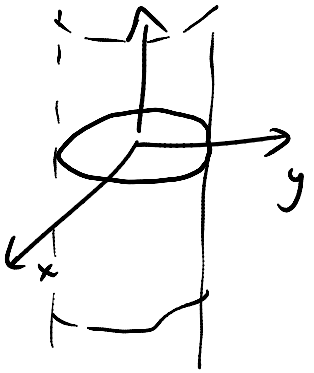
quadrant → 2D
octant → 3D

2D vs 3D:

in 2D, $x^2 + y^2 = 4$ is a circle:

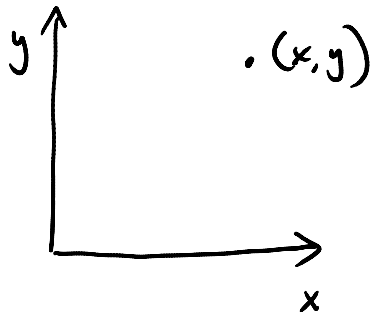


in 3D, $x^2 + y^2 = 4$ is a cylinder

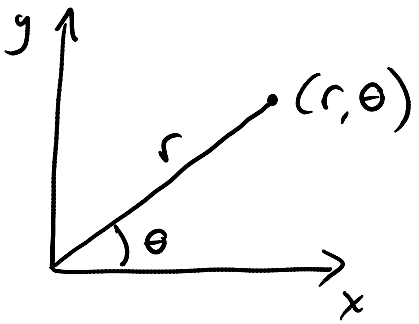


coordinate systems:

2D:



rectangular



polar

where

$x = r\cos\theta$

$y = r\sin\theta$

$r = \sqrt{x^2 + y^2}$

$\tan\theta = \frac{y}{x}$

3D: