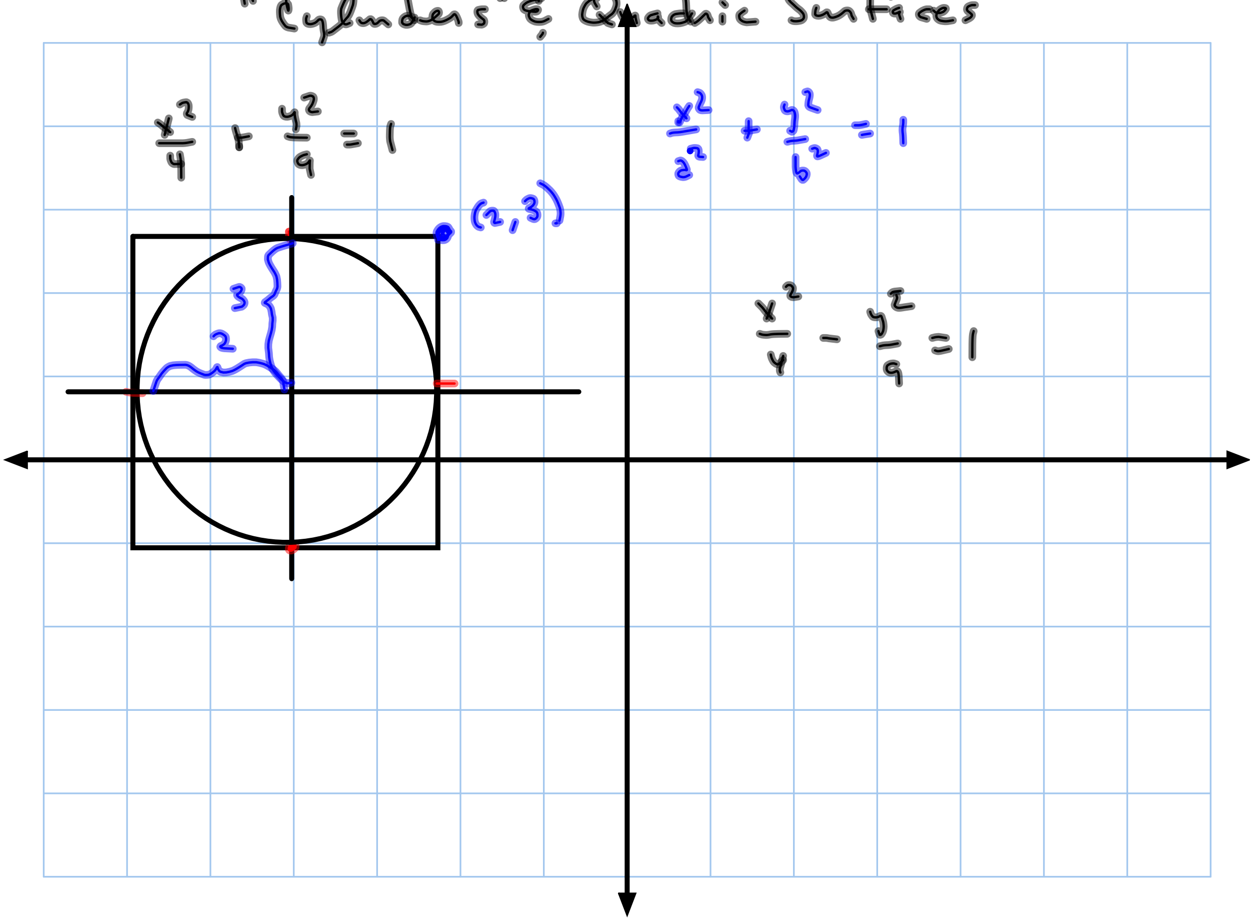
"Cylinders" & Quadric Surfaces

$$\frac{x^2}{4} + \frac{y^2}{9} = 1$$

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

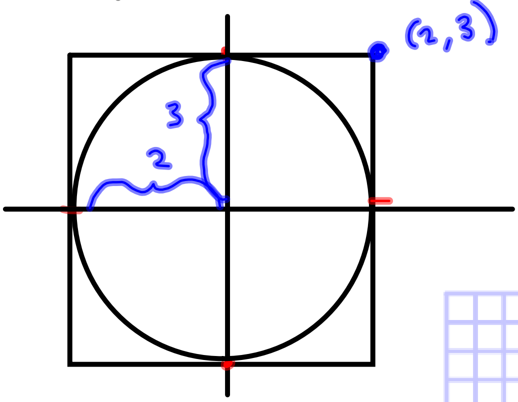
$$\frac{x^2}{4} - \frac{y^2}{9} = 1$$



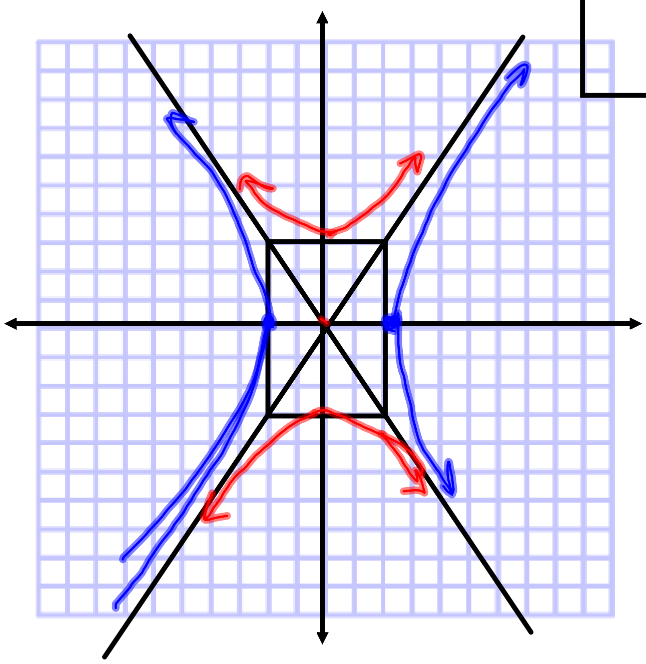
"Cylinders" & Quadric Surfaces

$$\frac{x^2}{4} + \frac{y^2}{9} = 1$$

$$\frac{x^2}{2^2} + \frac{y^2}{b^2} = 1$$



$$\frac{x^2}{4} - \frac{y^2}{9} = 1$$



$$\frac{y^2}{9} - \frac{x^2}{4} = 1$$

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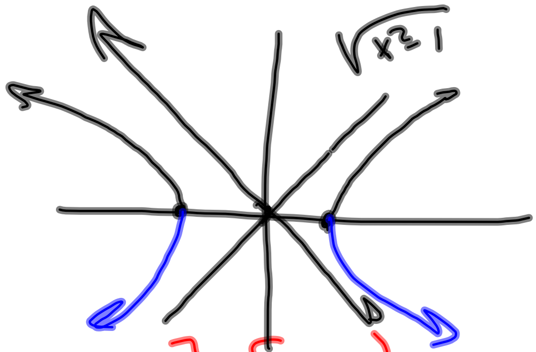
$\frac{x^2}{1} - \frac{y^2}{1} = 1$

$-y^2 = 1 - x^2$

$y^2 = x^2 - 1$

$y = \pm\sqrt{x^2-1}$

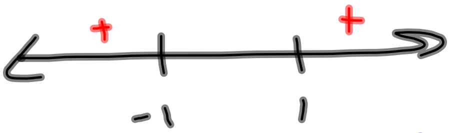
$-\sqrt{x^2-1}$



$\sqrt{x^2-1}$ $\mathcal{D} = (-\infty,-1] \cup [1,\infty)$

Need $x^2-1 \geq 0$

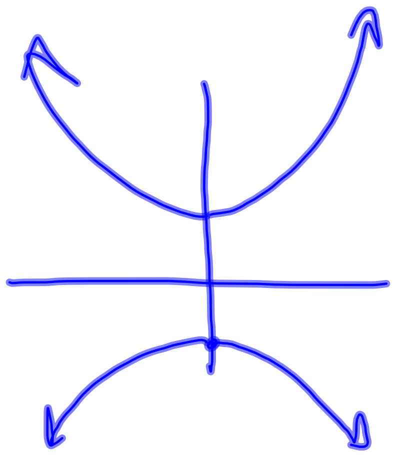
$(x-1)(x+1) \geq 0$



$y^2 - x^2 = 1$

$y^2 = x^2 + 1$

$y = \pm\sqrt{x^2+1}$



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$x^2+y^2-z^2=1$ See table

Think of contours & cross-sections.

Parallel to the xy-axis: $z=$ constant.

$z=0$:

$x^2+y^2=1$ circle of radius 1

$z=1$:

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

Looking down the z-axis

$x^2+y^2-z^2=1$ See table

Think of contours & cross-sections.

Parallel to the xy-axis: $z =$ constant.

$z=0$:

$x^2+y^2=1$ circle of radius 1

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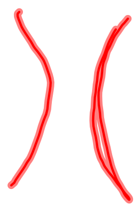
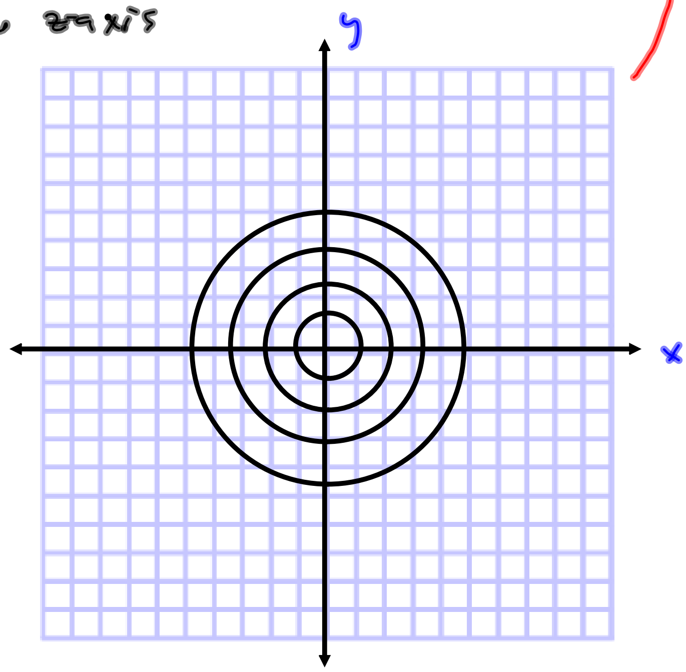


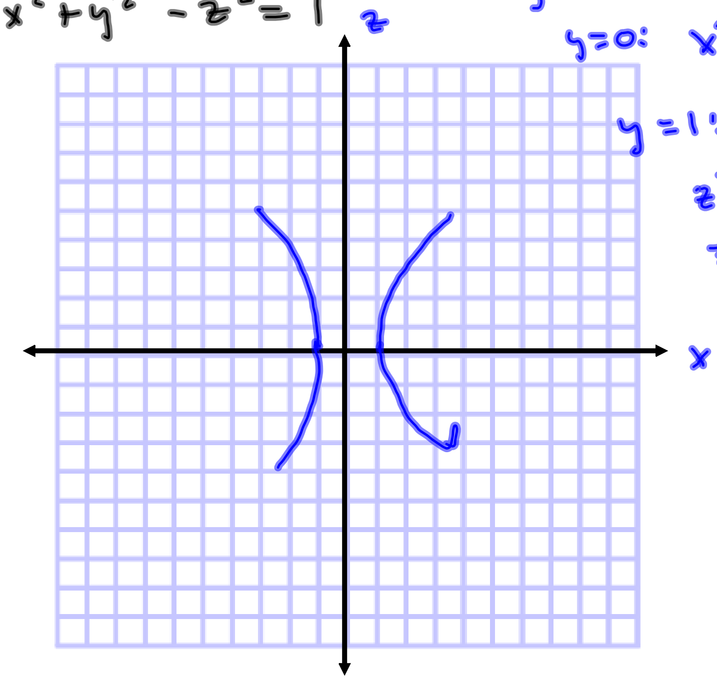
Looking down the z-axis



$z=-1$: same as $z=1$

Just from level curves $z=$ constant.

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



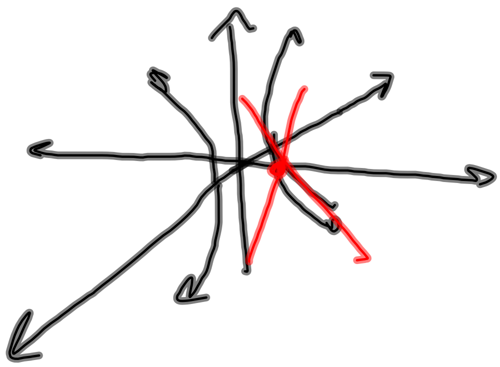
$y=$ constant:

$y=0$: $x^2-z^2=1$ In the xz-plane

$y=1$: $x^2-z^2=0$

$z^2=x^2$

$z=\pm\sqrt{x^2}=\pm|x|$



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Review of conics
& seeing them as cross-sections
of these quadric surfaces.

Trace in the xz-, xy-, yz-planes is
important for later.

Practice with $x = K$, $y = K$, $z = K$ } Planes parallel to the above.

$x=0$: yz-plane
$y=0$: xz-plane
$z=0$: xy-plane.

Good practice for $\iiint$

TABLE 1 pg 844

See Matching questions #21-28