

Practica I

Funciones

Problema 1

En los siguientes problemas:

- * Encuentre el dominio de la función,
- * Encuentre la imagen de la función,
- * Describa las curvas de nivel,
- * Halle la frontera del dominio de la función
- * Determine si la región anterior es un abierto, Cerrado o ninguna de las dos.
- * Determine si el dominio es acotado o no.

1) $f(x, y) = y - x$

a)

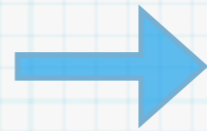


b)

Los Números reales

c)

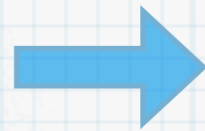
$$f(x, y) = C$$



$$y - x = C$$

Si

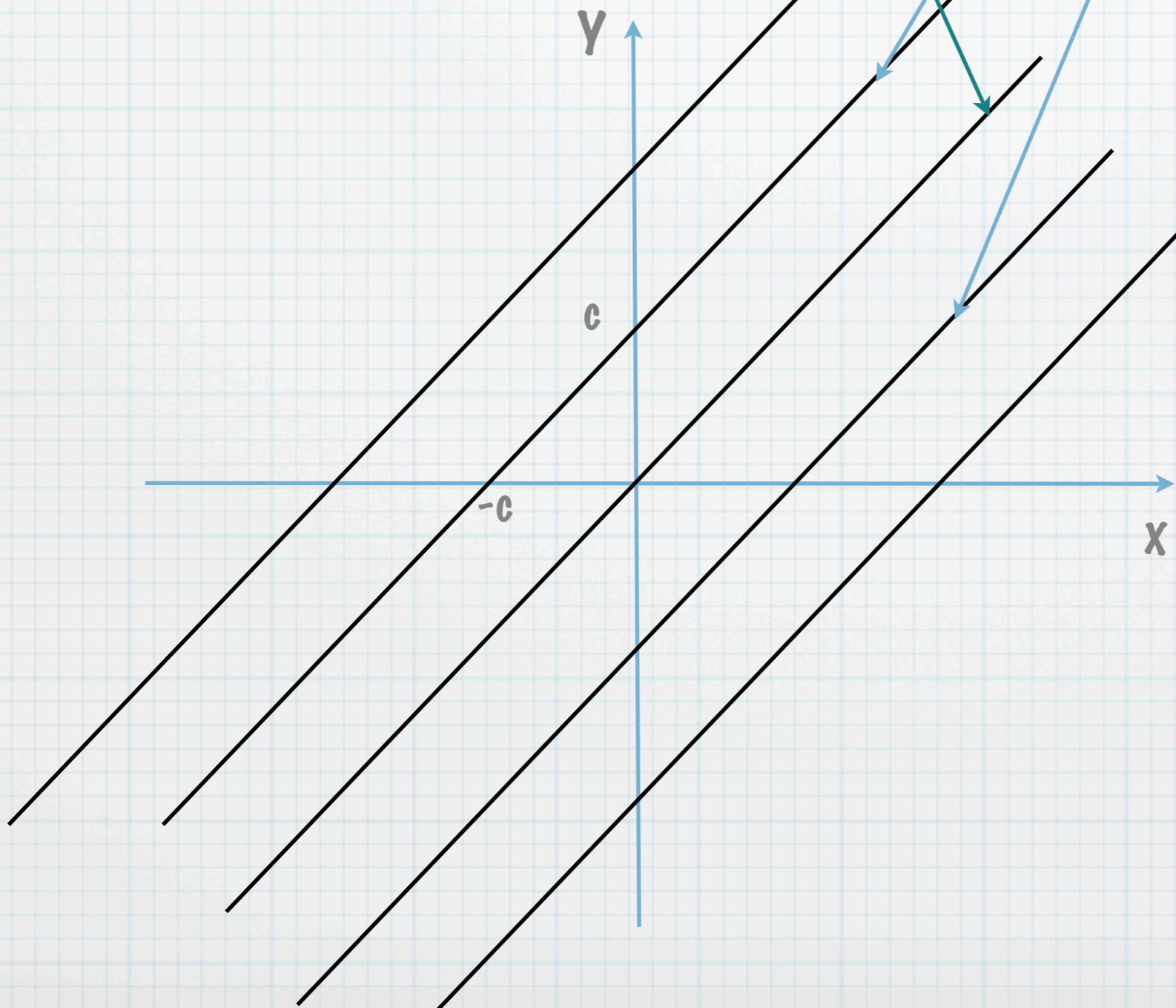
$$C = 0$$



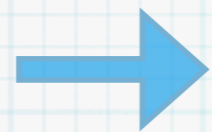
$$y = x$$

Rectas paralelas a

$$y = x$$



d) $f(x, y) = y - x$



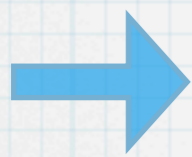
No Hay Frontera

e) Es tanto Cerrado como
abierto

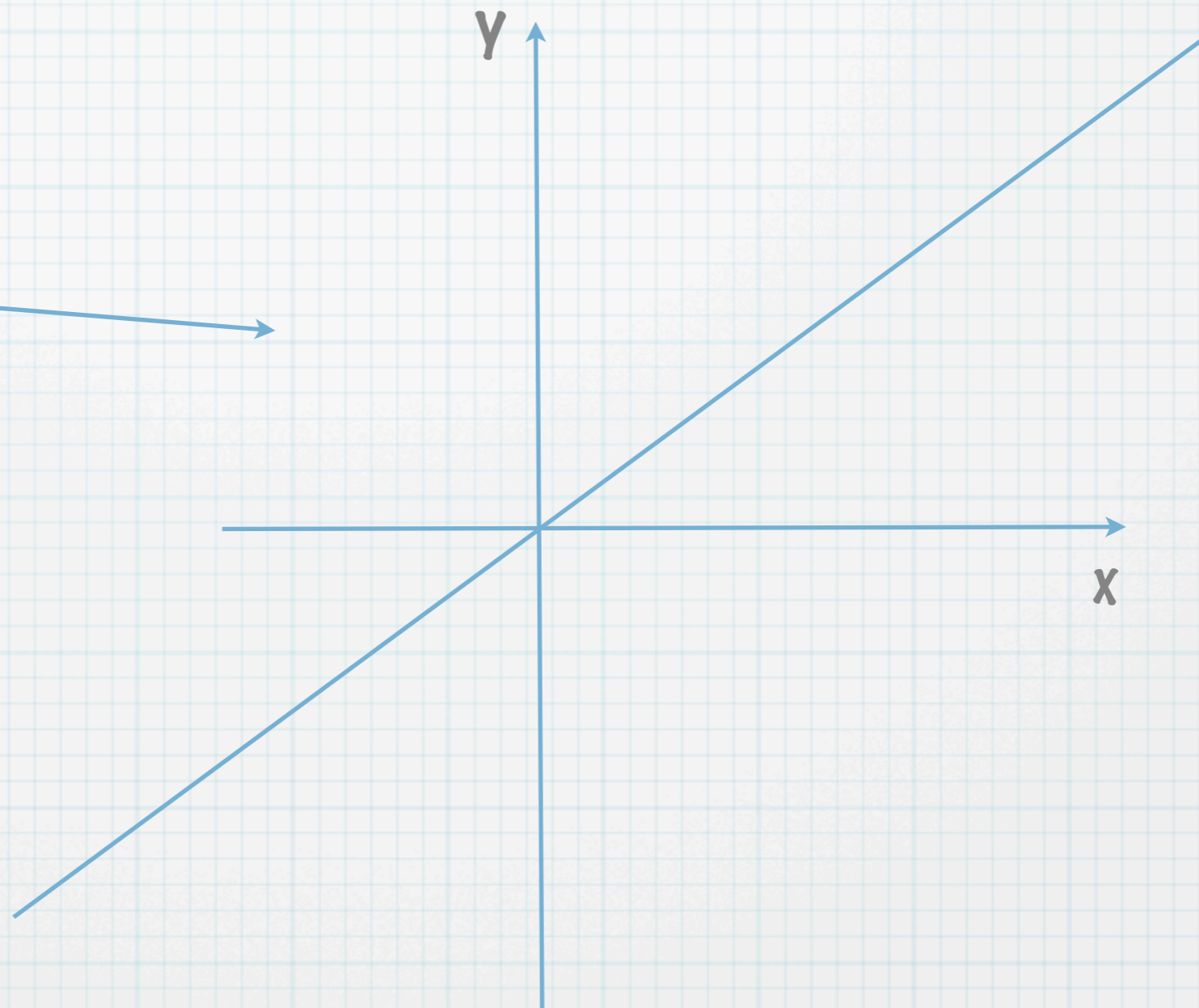
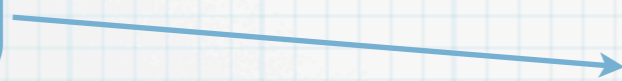
f) No esta acotado

$$2) f(x, y) = \sqrt{y - x}$$

$$a) y - x \geq 0$$



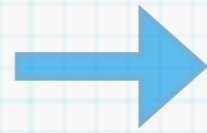
$$y \geq x$$



$$b) z \geq 0$$

c)

$$f(x, y) = C$$

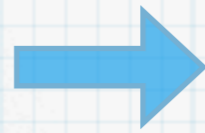


$$y - x = C$$

$$C \geq 0$$

Si

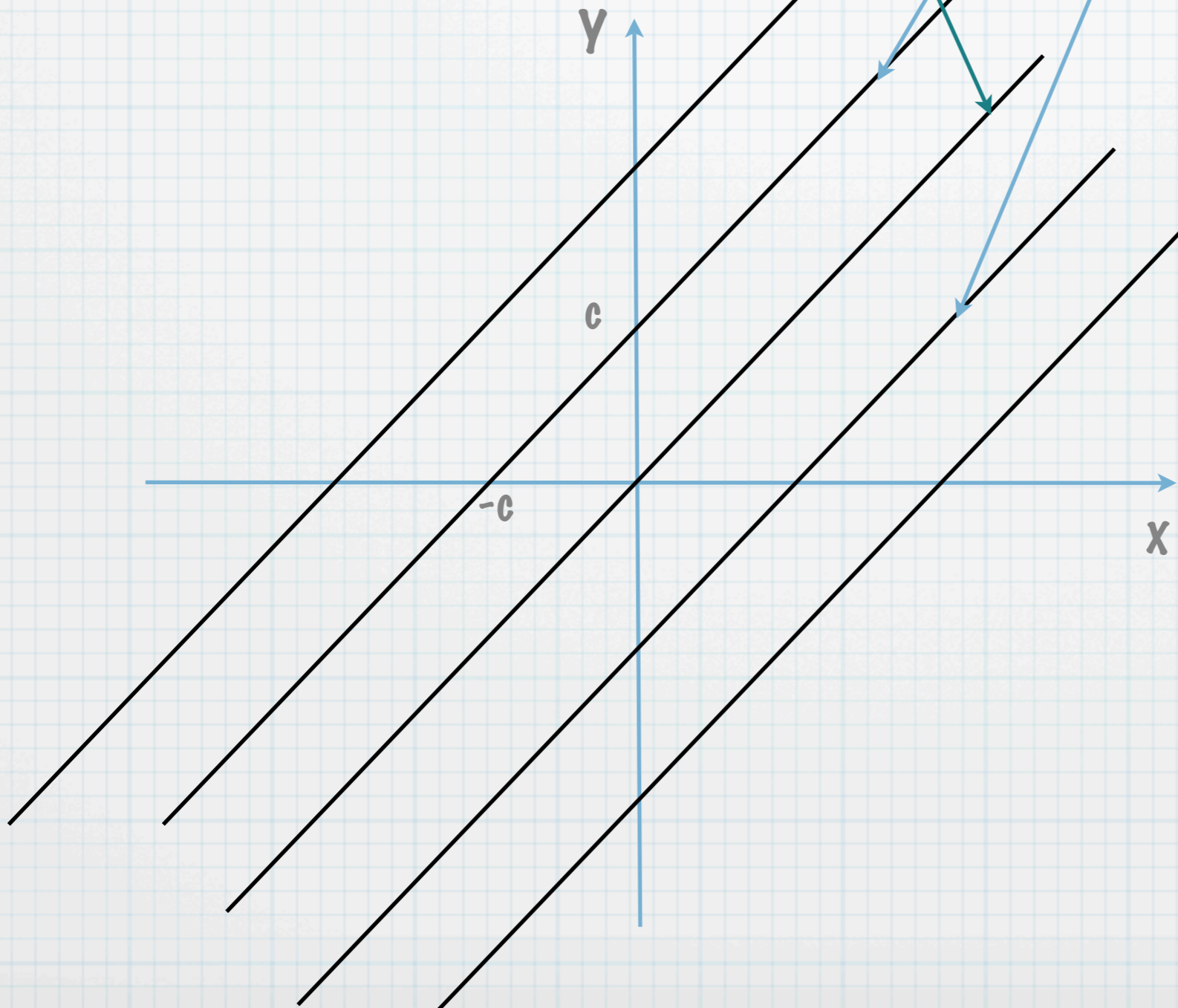
$$C = 0$$



$$y = x$$

Rectas paralelas a

$$y = x$$



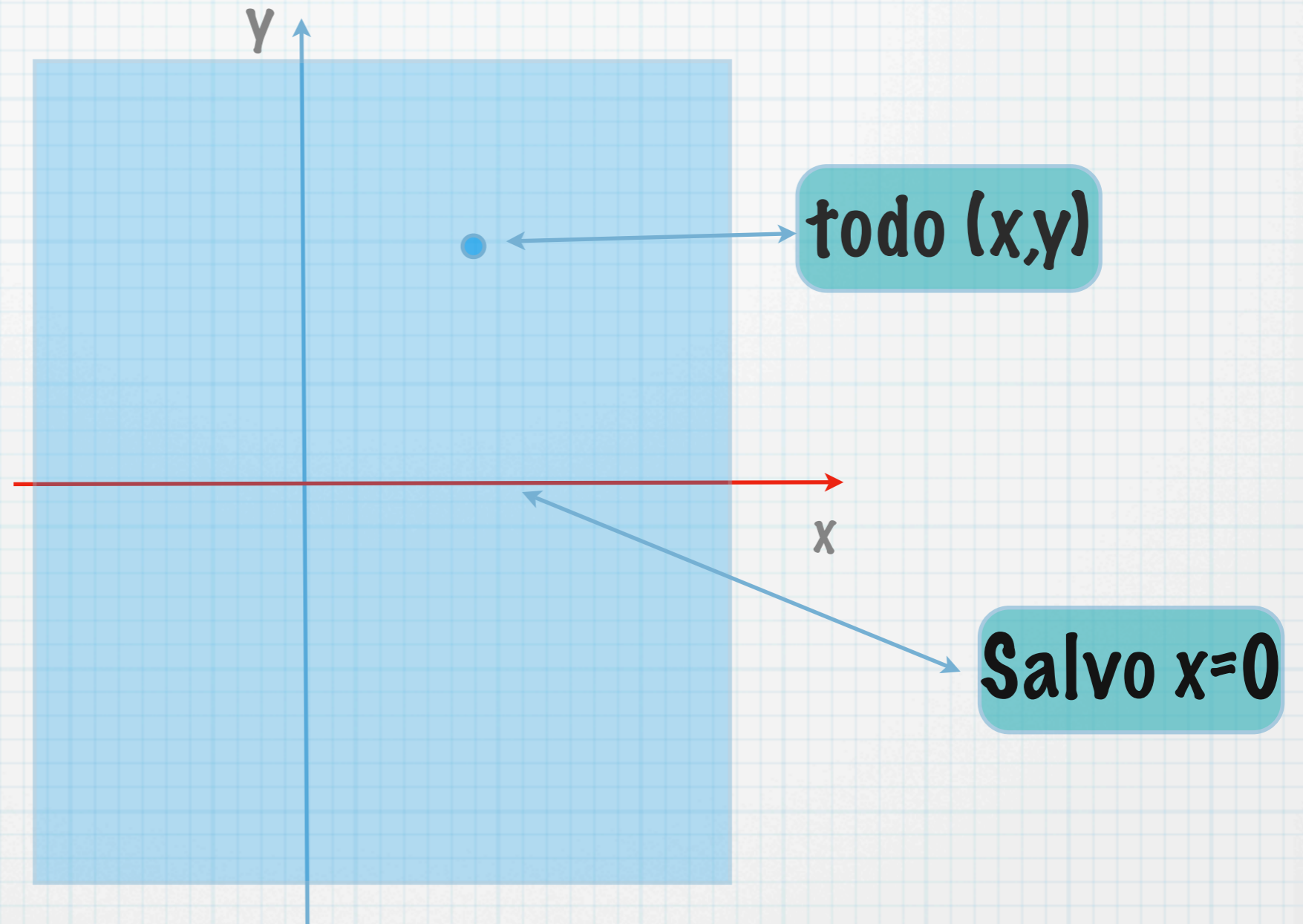
d) $\sqrt{y - x} = 0 \rightarrow y = x$

e) Es cerrado

f) No esta acotado

3) $f(x, y) = \operatorname{tg}^{-1}\left(\frac{y}{x}\right)$

a) Dominio

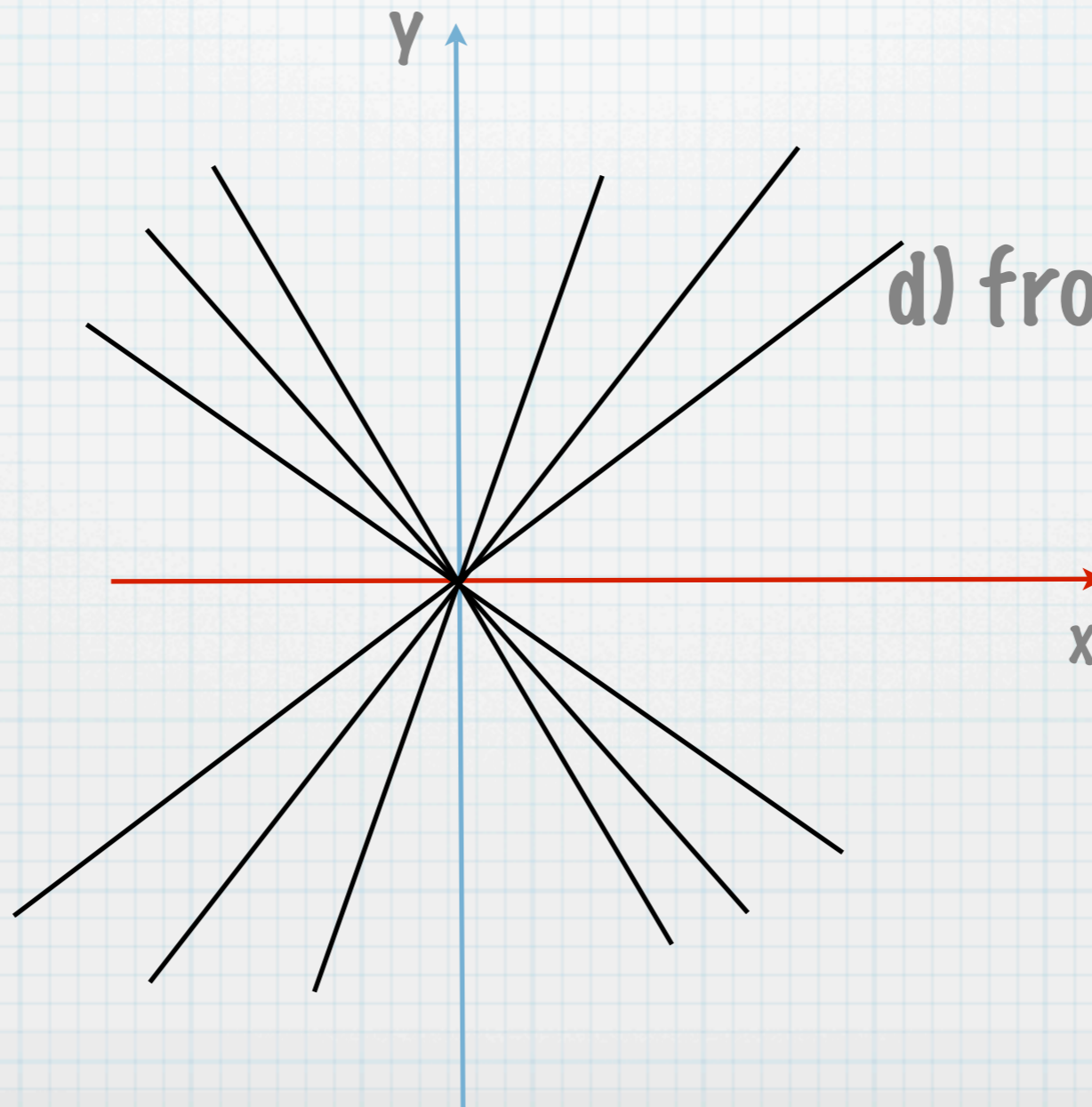


b) Rango $-\frac{\pi}{2} < z < \frac{\pi}{2}$

c) Curvas de nivel

$$\operatorname{tg}^{-1}\left(\frac{y}{x}\right) = C \quad \longrightarrow \quad \frac{y}{x} = C$$

\longrightarrow $y = Cx$ para $x \neq 0$

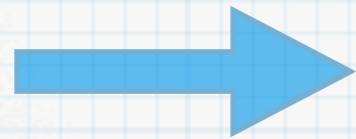


e) es una región abierta

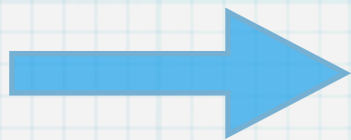
$$4) f(x, y) = \frac{1}{\sqrt{16 - x^2 - y^2}}$$

a)

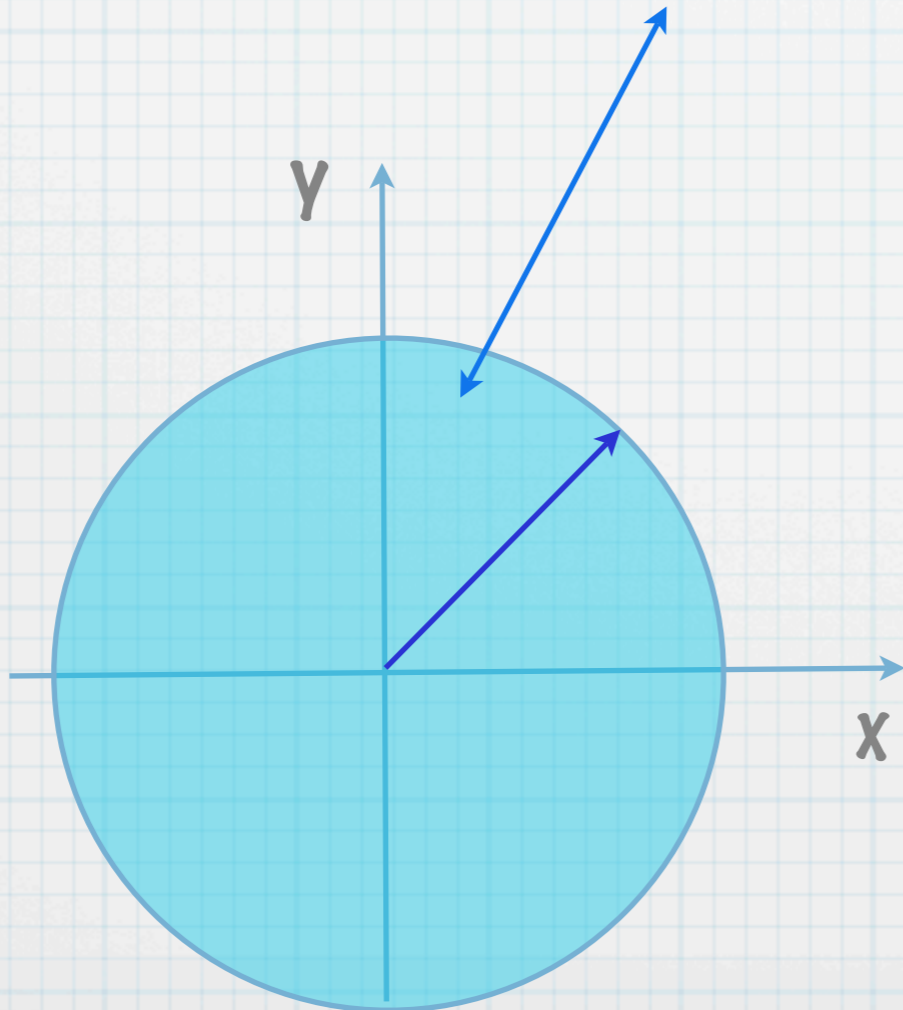
$$\frac{1}{\sqrt{16 - x^2 - y^2}}$$



$$16 - x^2 - y^2 > 0$$



$$x^2 + y^2 < 16$$



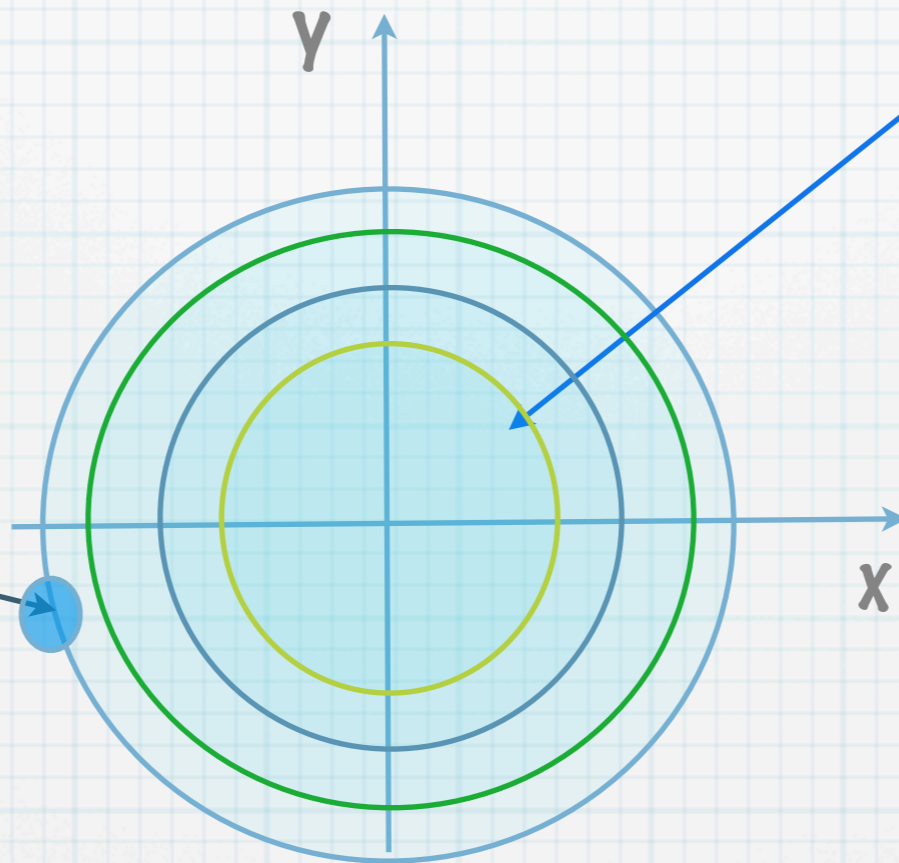
b) $z \geq \frac{1}{4}$

c)

$$\frac{1}{\sqrt{16 - x^2 - y^2}} = C \quad \longrightarrow \quad x^2 + y^2 < 16$$

d) La frontera es:

$$x^2 + y^2 = 16$$

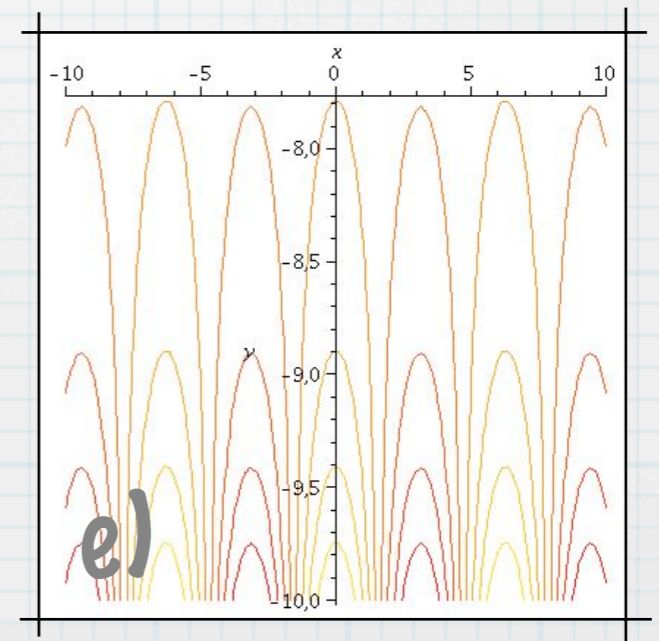
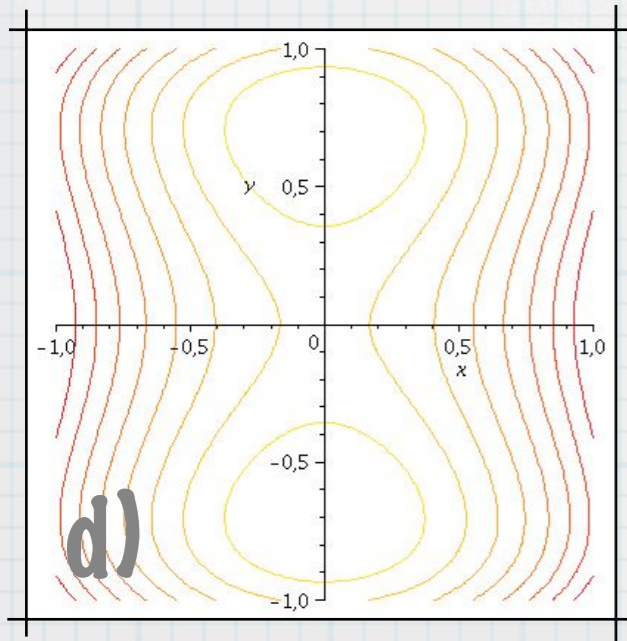
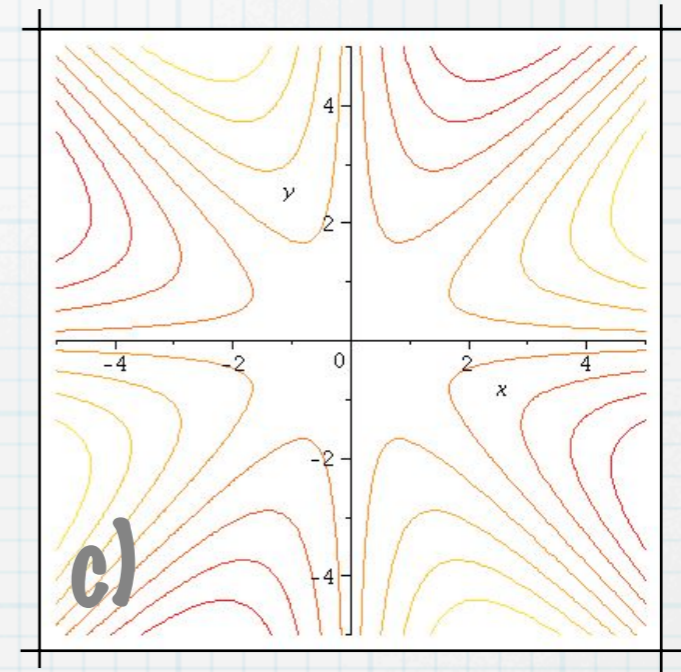
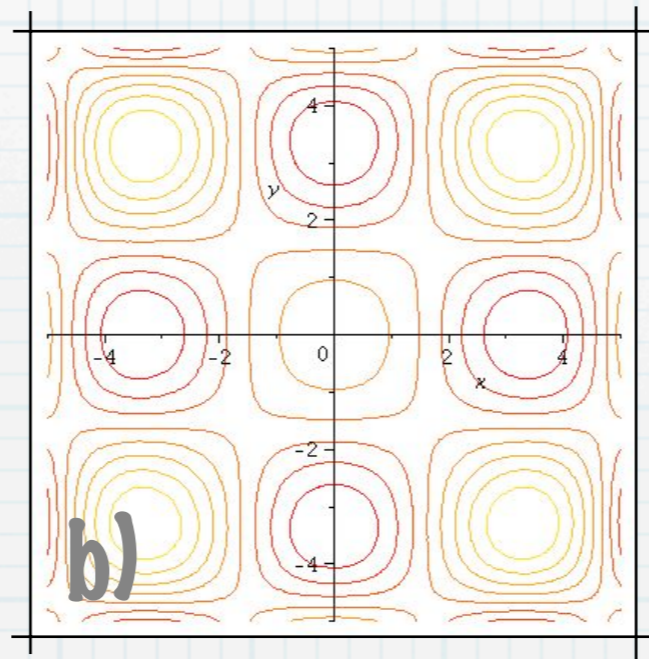
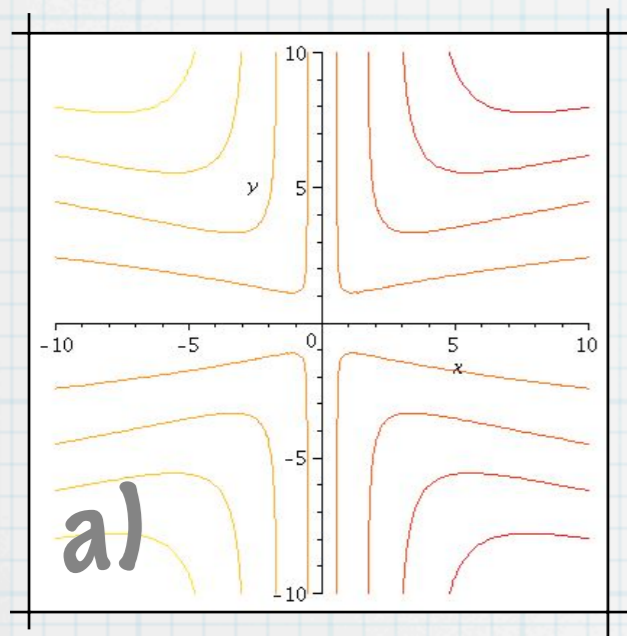


e) la región es un
abierto

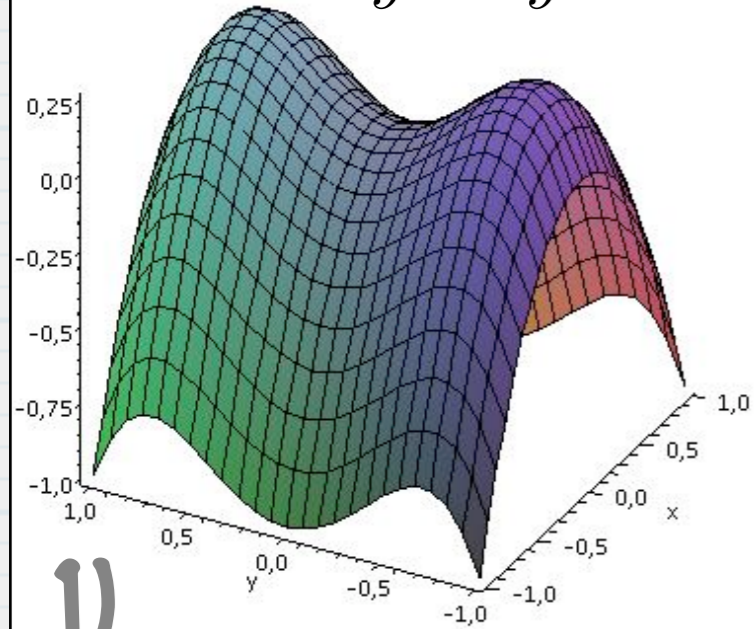
f) la región
es acotada

Problema 2.

Para las siguientes curvas de nivel asocie una de las funciones que se muestran

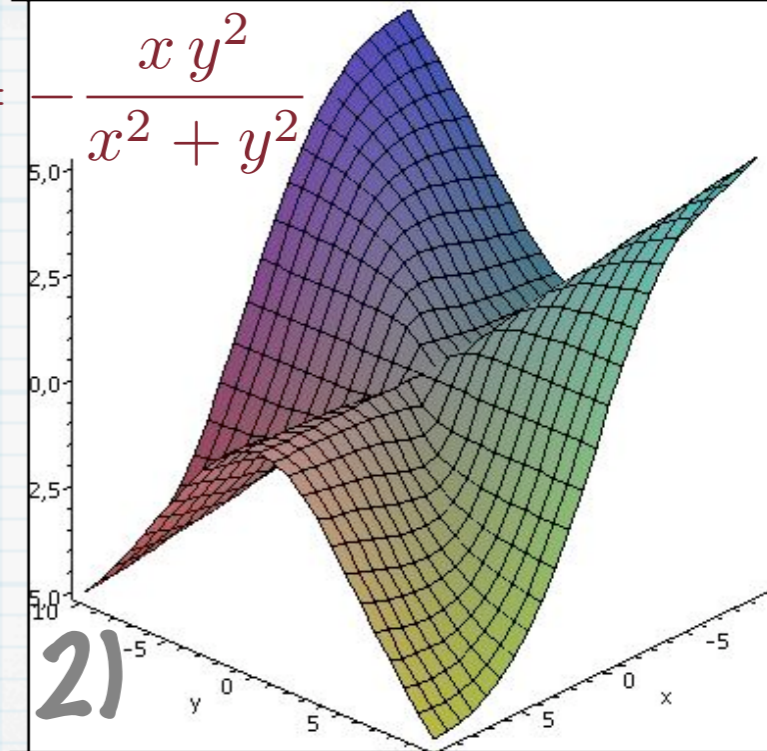


$$z = y^2 - y^4 - x^2$$



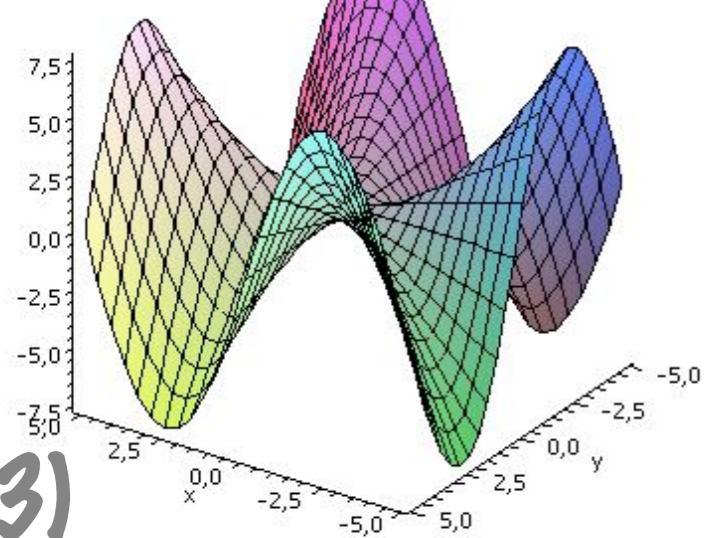
1)

$$z = \frac{xy^2}{x^2 + y^2}$$



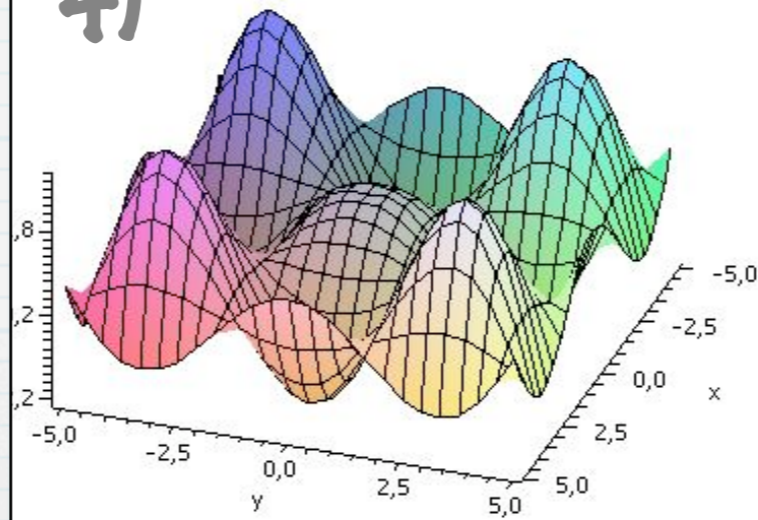
2)

$$z = \frac{xy(x^2 - y^2)}{x^2 + y^2}$$



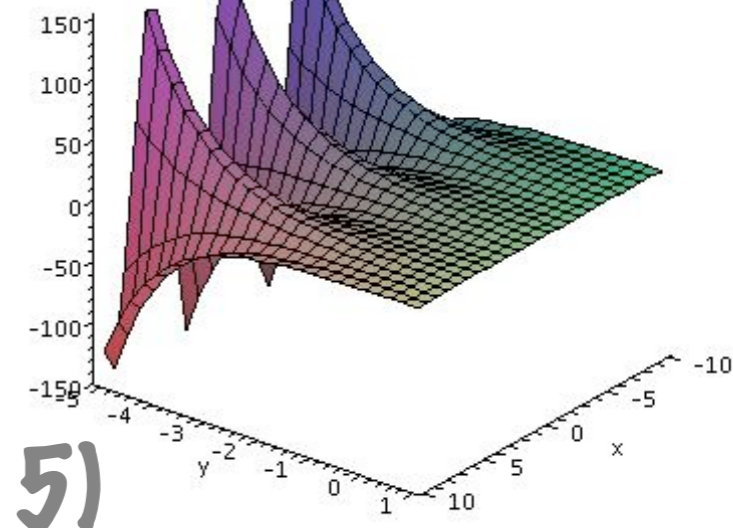
3)

4)



$$z = (\cos(x)) (\cos(y)) e^{\frac{\sqrt{x^2 + y^2}}{4}}$$

$$z = e^{-y} \cos(x)$$



5)

Problema 3.

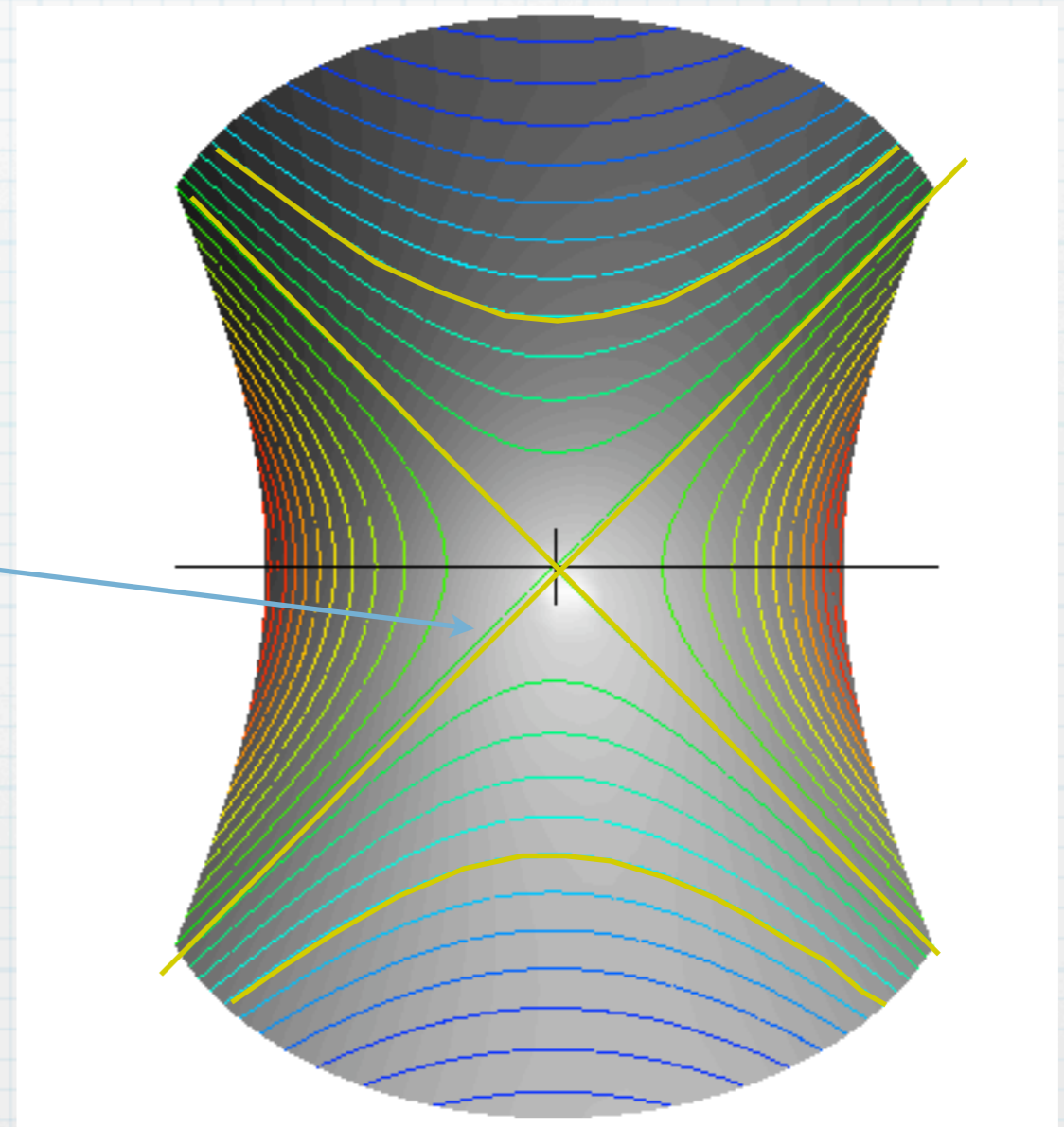
Esbozar las curvas de nivel, de :

$$f(x, y) = x^2 - y^2$$

Curvas de nivel

$$z = c$$

$$c = x^2 - y^2$$



Problema 4.

Realice un esbozo de la superficie asociada a cada función y de sus curvas de nivel.

a) $f(x, y) = y^2$

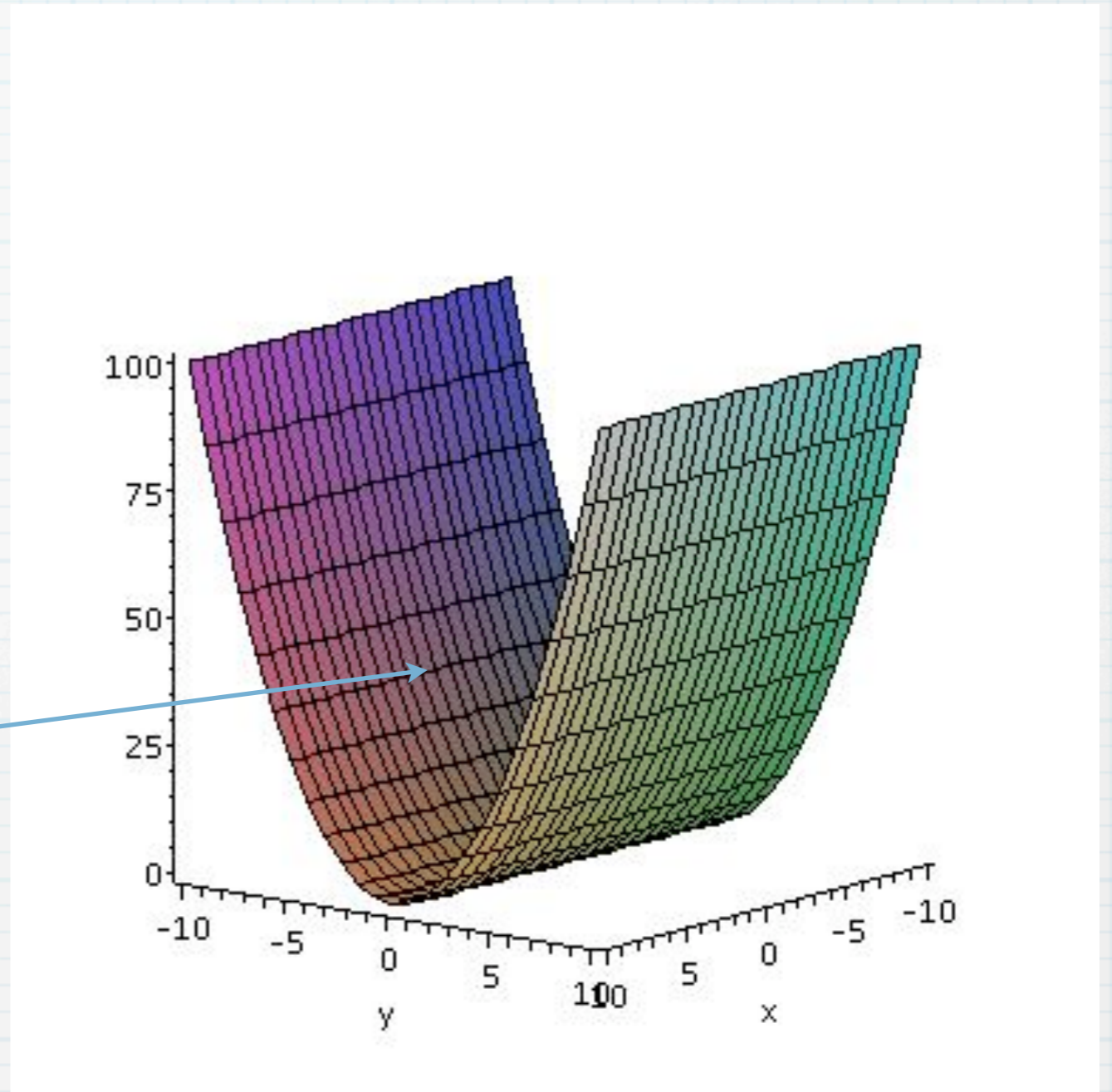
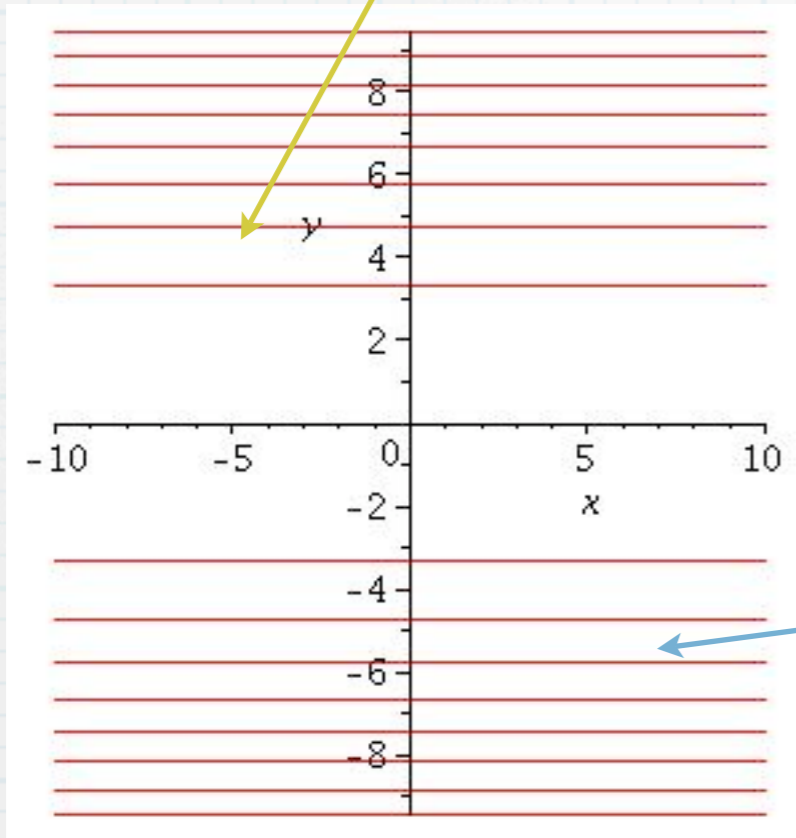
c) $f(x, y) = 4x^2 + y^2 + 1$

b) $f(x, y) = \sqrt{x^2 + y^2}$

d) $f(x, y) = 4x^2 + y^2$

a)

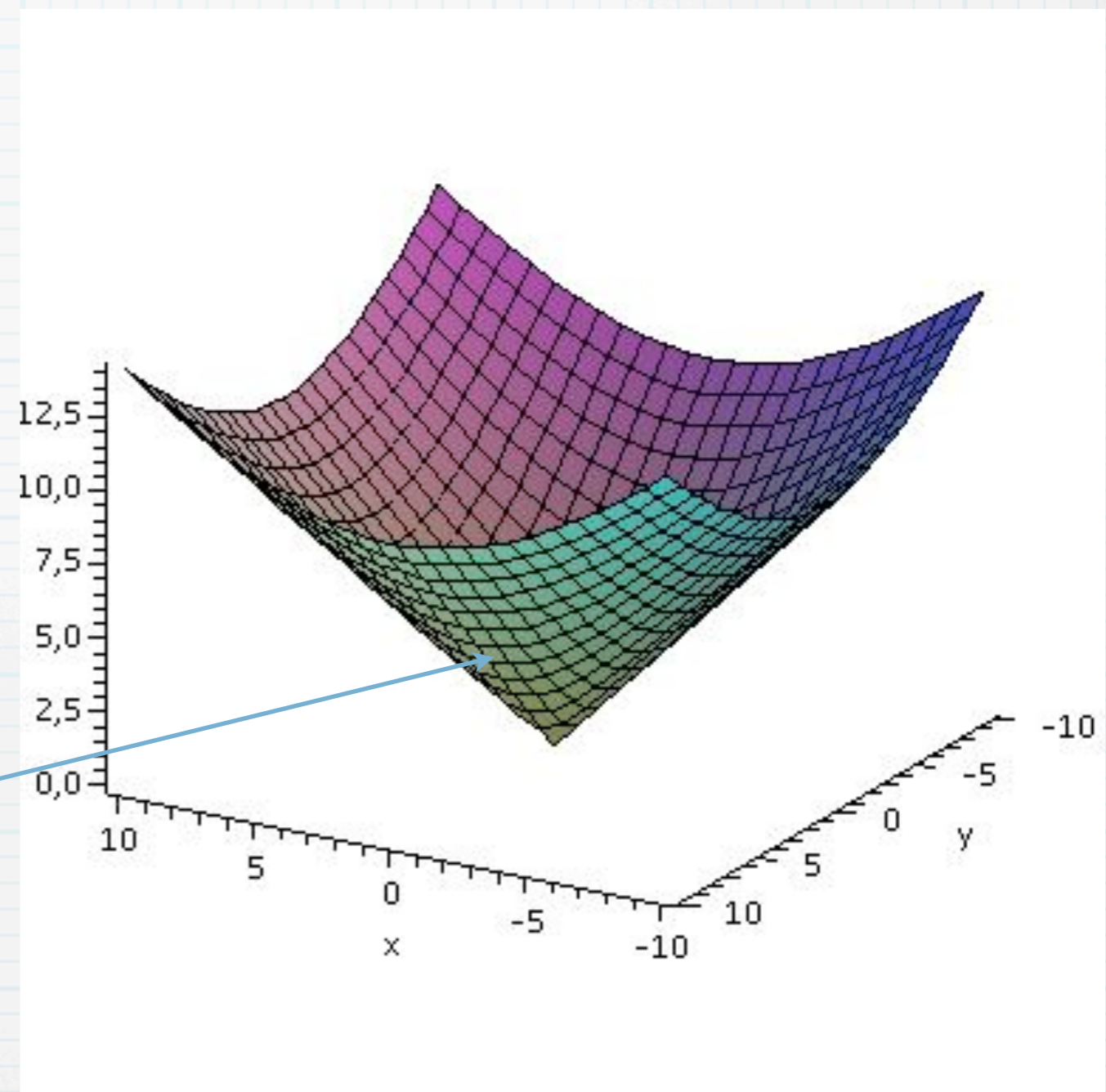
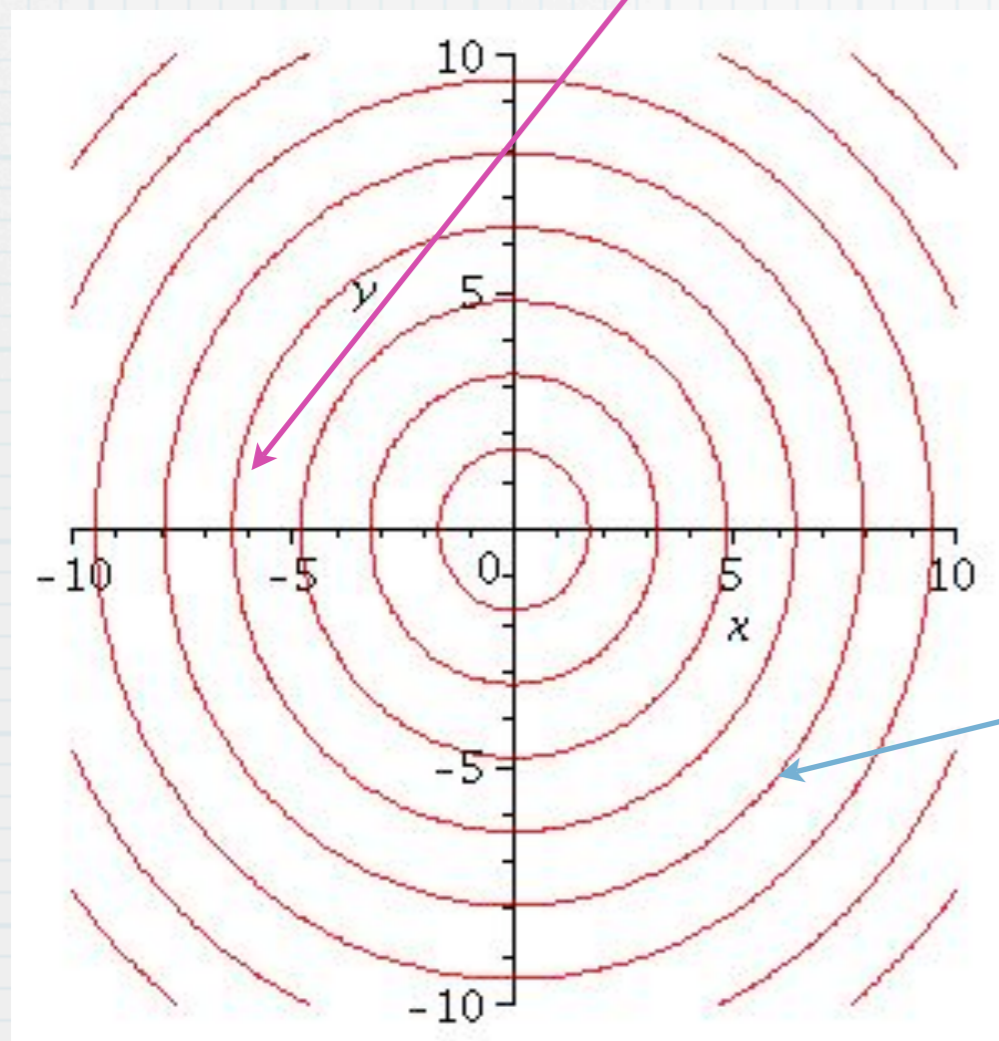
$$y^2 = C$$



$$f(x, y) = y^2$$

b)

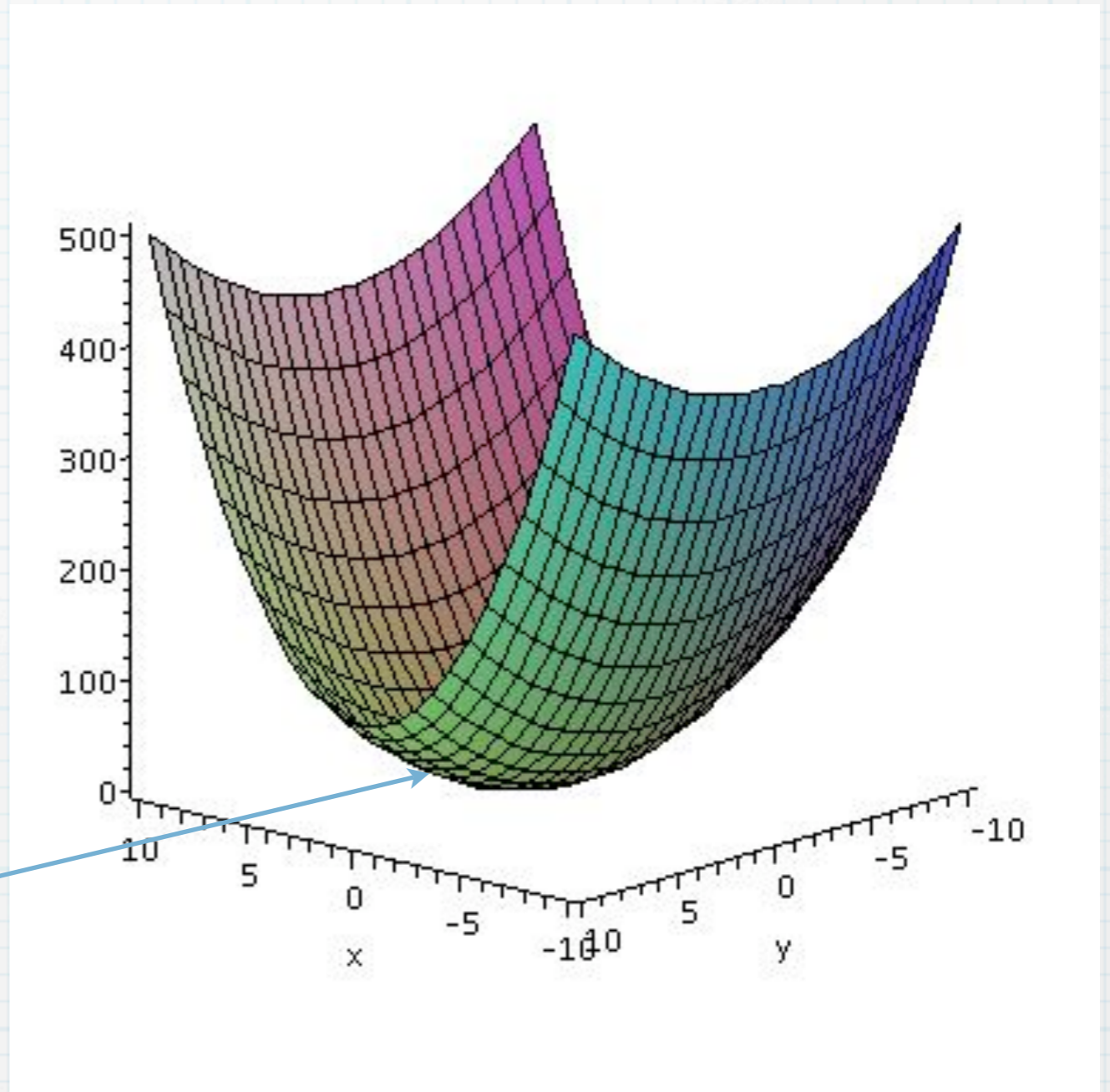
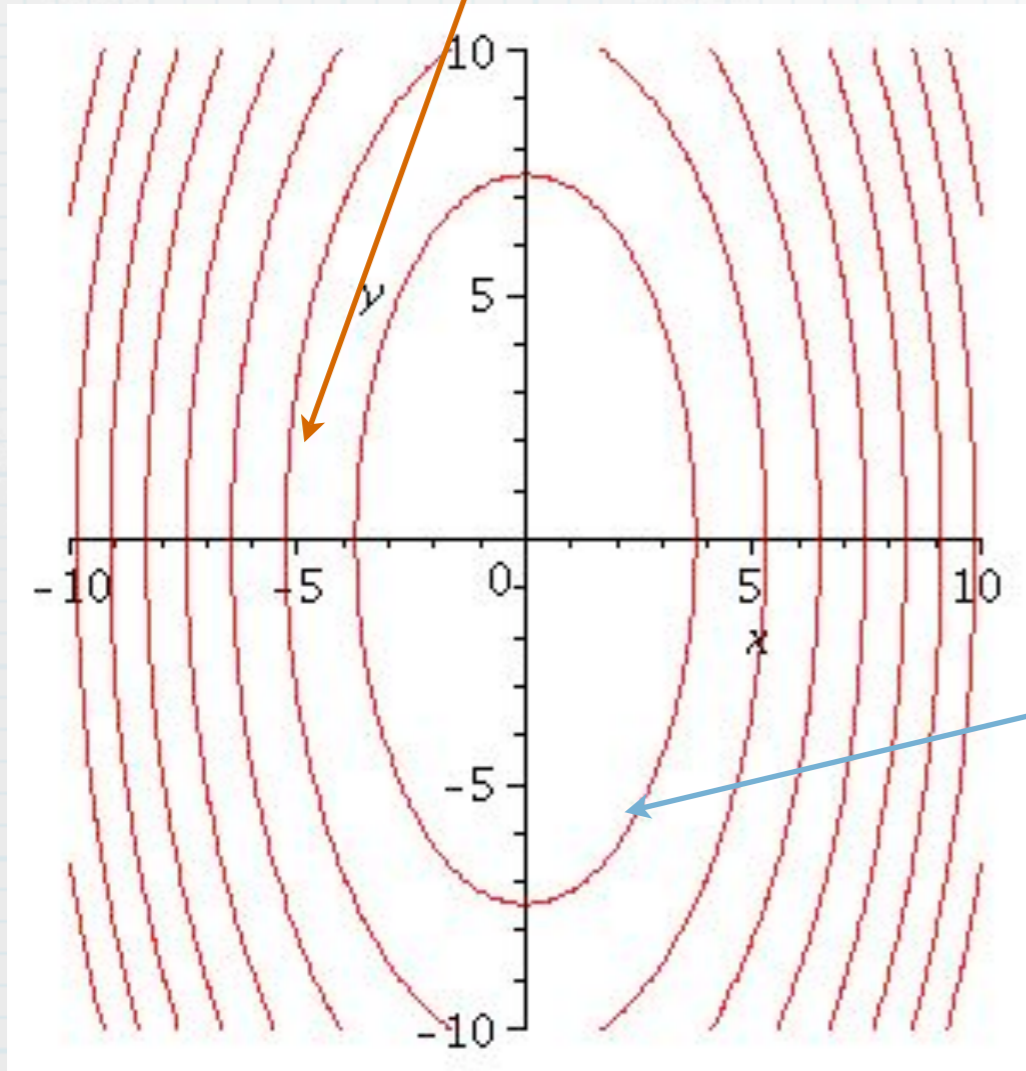
$$x^2 + y^2 = c^2$$



$$f(x, y) = \sqrt{x^2 + y^2}$$

c)

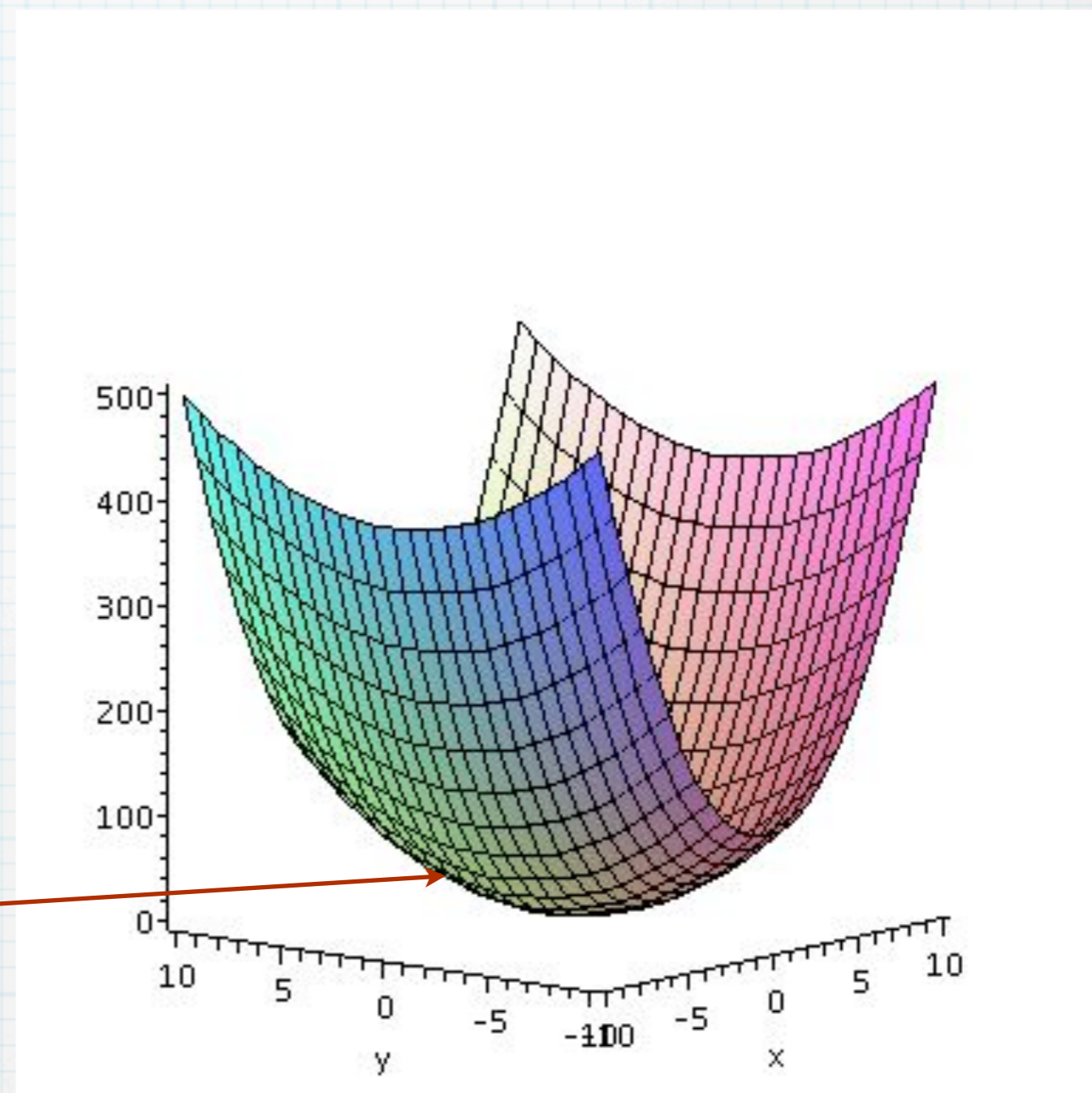
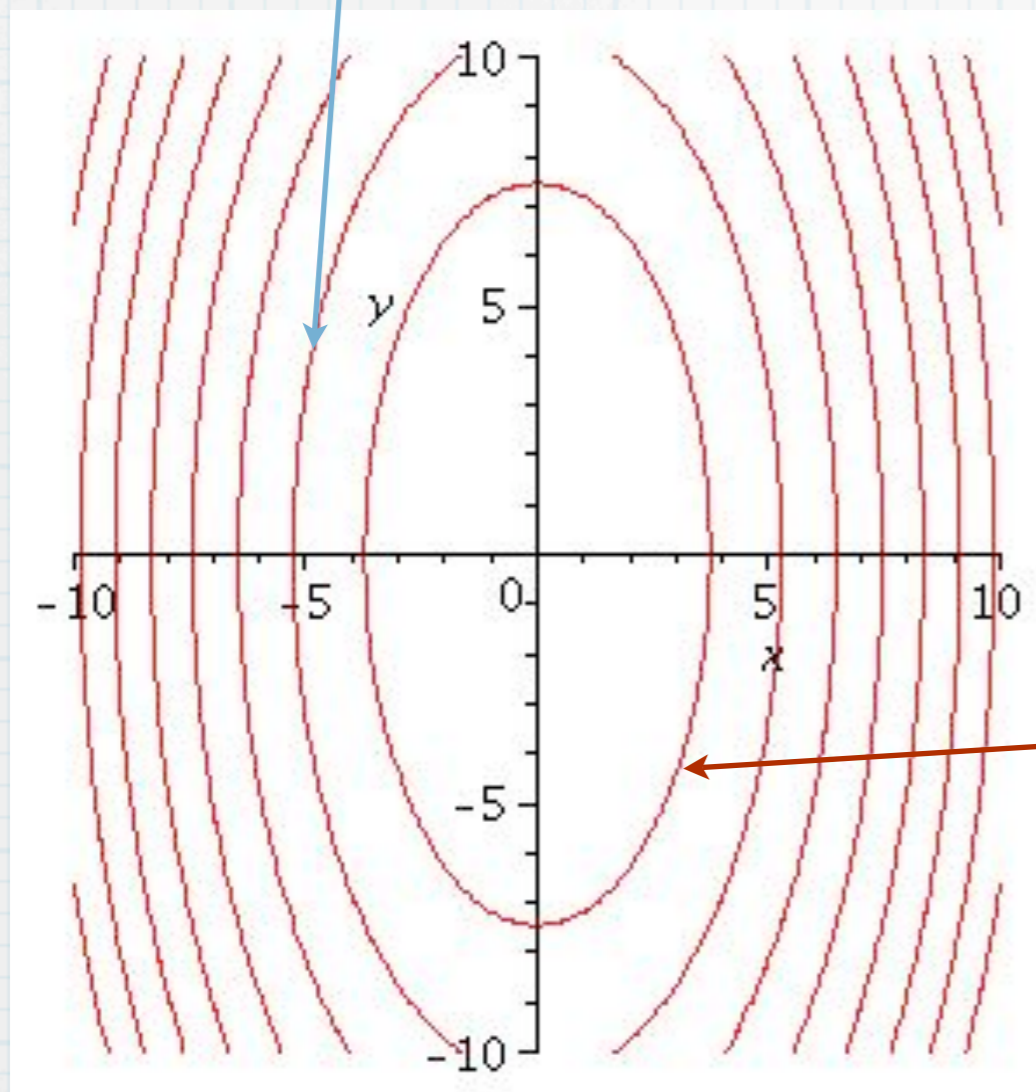
$$4x^2 + y^2 + 1 = c$$



$$f(x, y) = 4x^2 + y^2 + 1$$

d)

$$4x^2 + y^2 = c$$



$$f(x, y) = 4x^2 + y^2$$