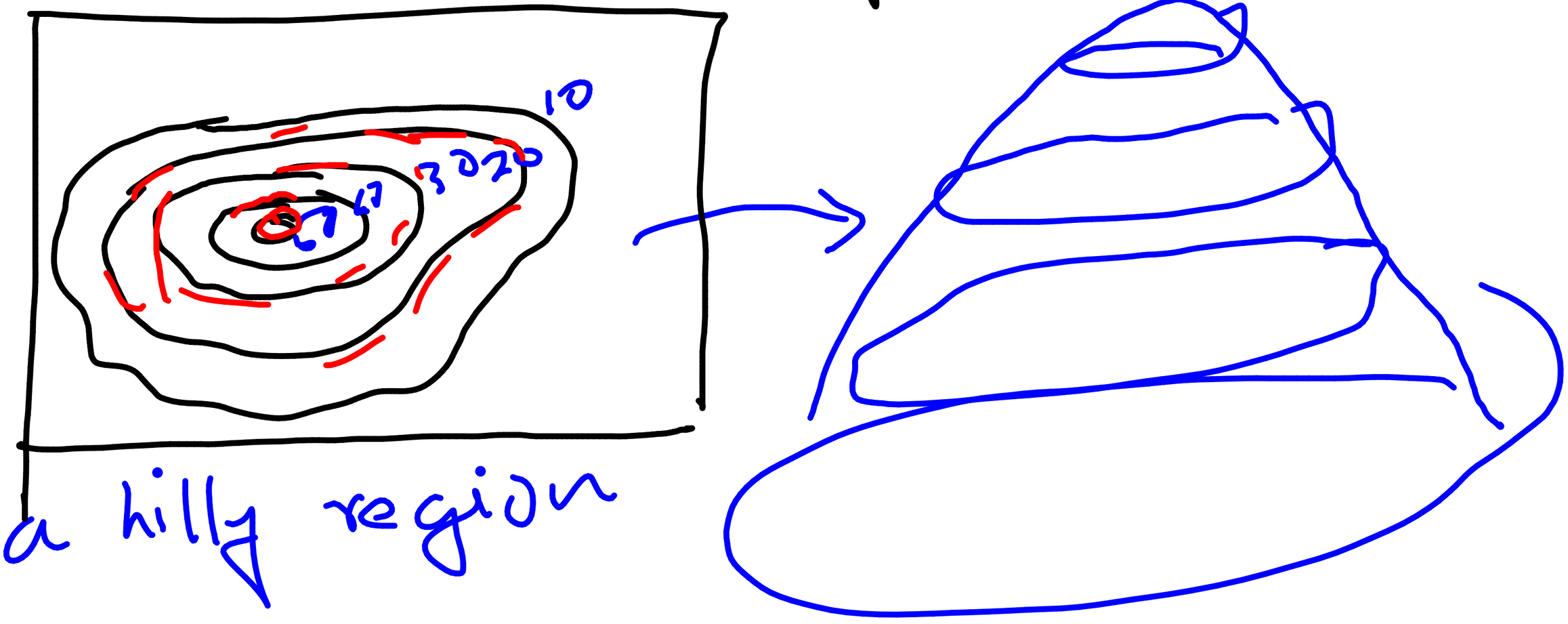
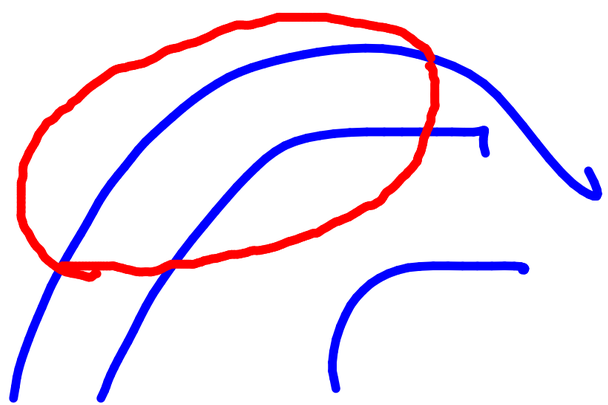
contour plot



a hilly region

Def^n: Contour curves of the function $f(x,y)$ are the family of curves given by the eq^n $f(x,y) = c$

$c = 10$

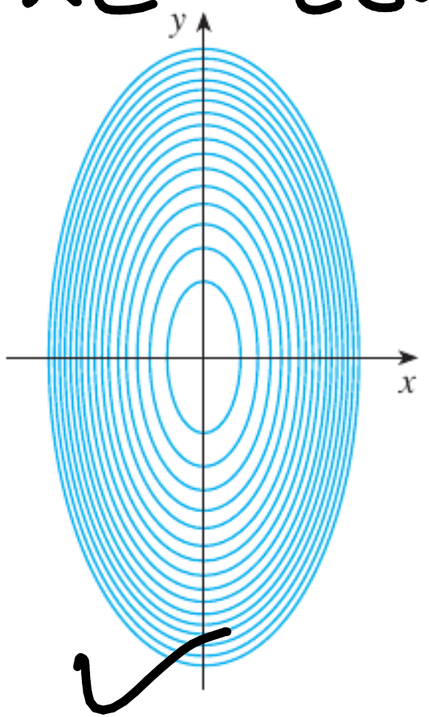


where c is arbitrary

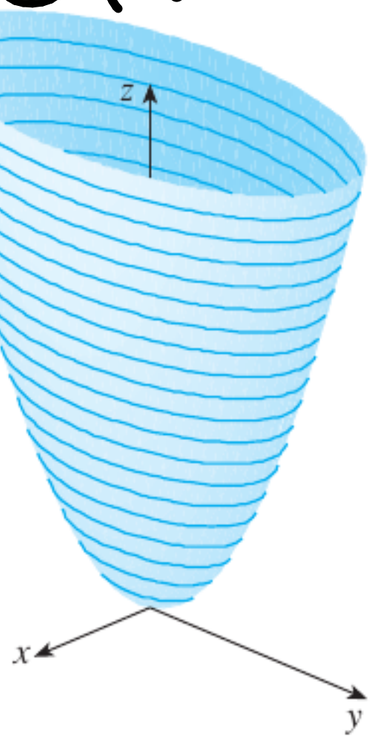
contour curves, or *level curves.*

e.g. $f(x,y) = x^2 + y^2$

one contour plot:



(a) Contour map



(b) Horizontal traces are raised level curves

$x^2+y^2=0$

$x^2+y^2=1$

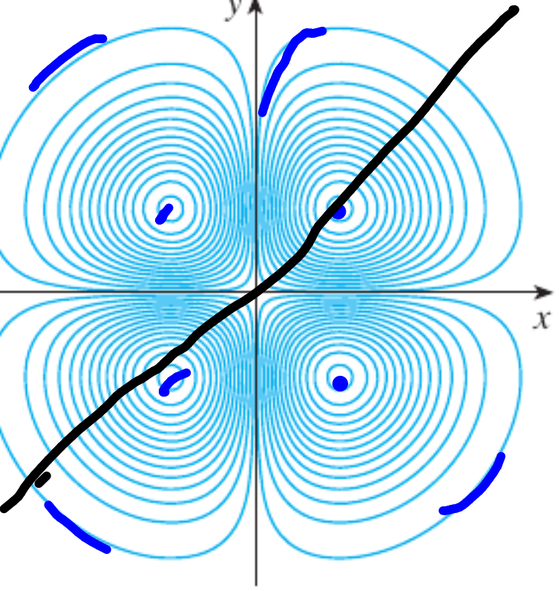
$x^2+y^2=2$

$x^2+y^2=3$

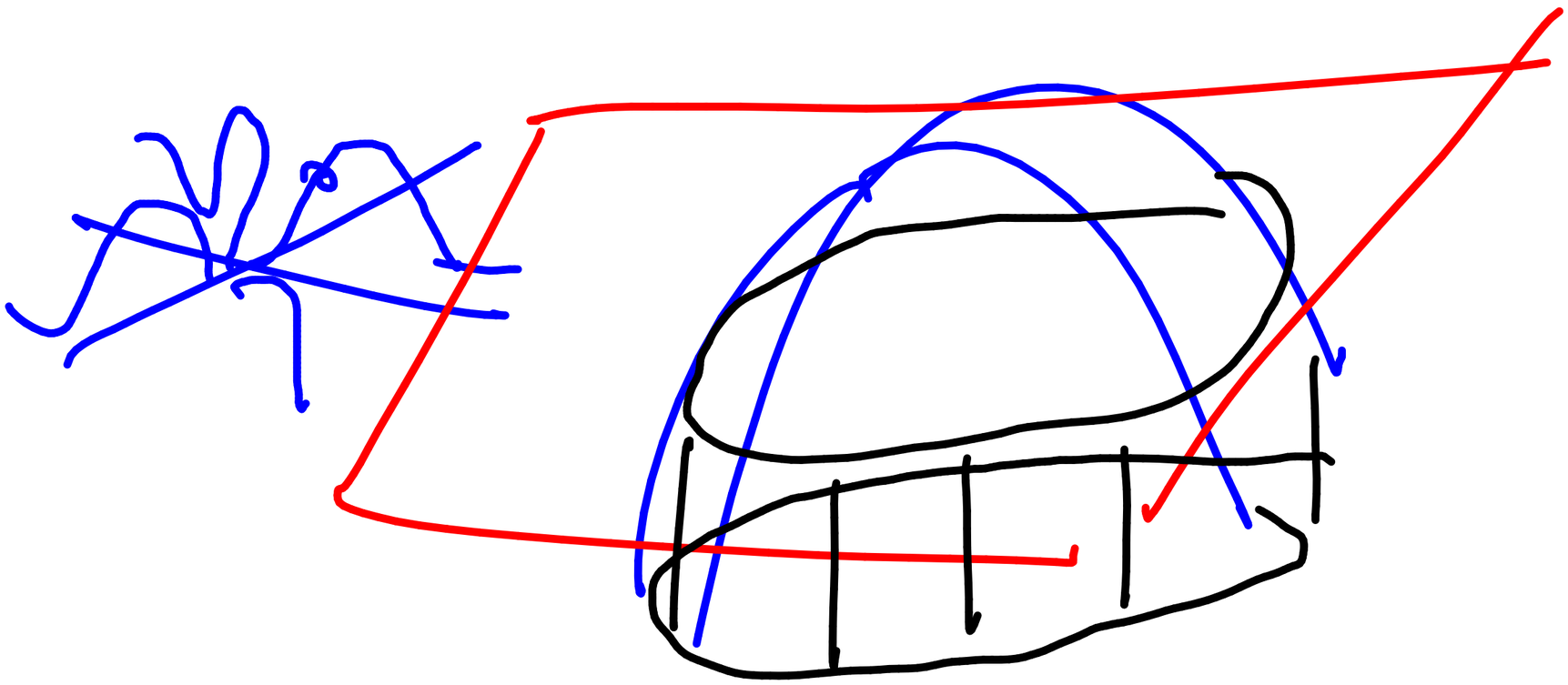
the family of level curves

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

Contour c

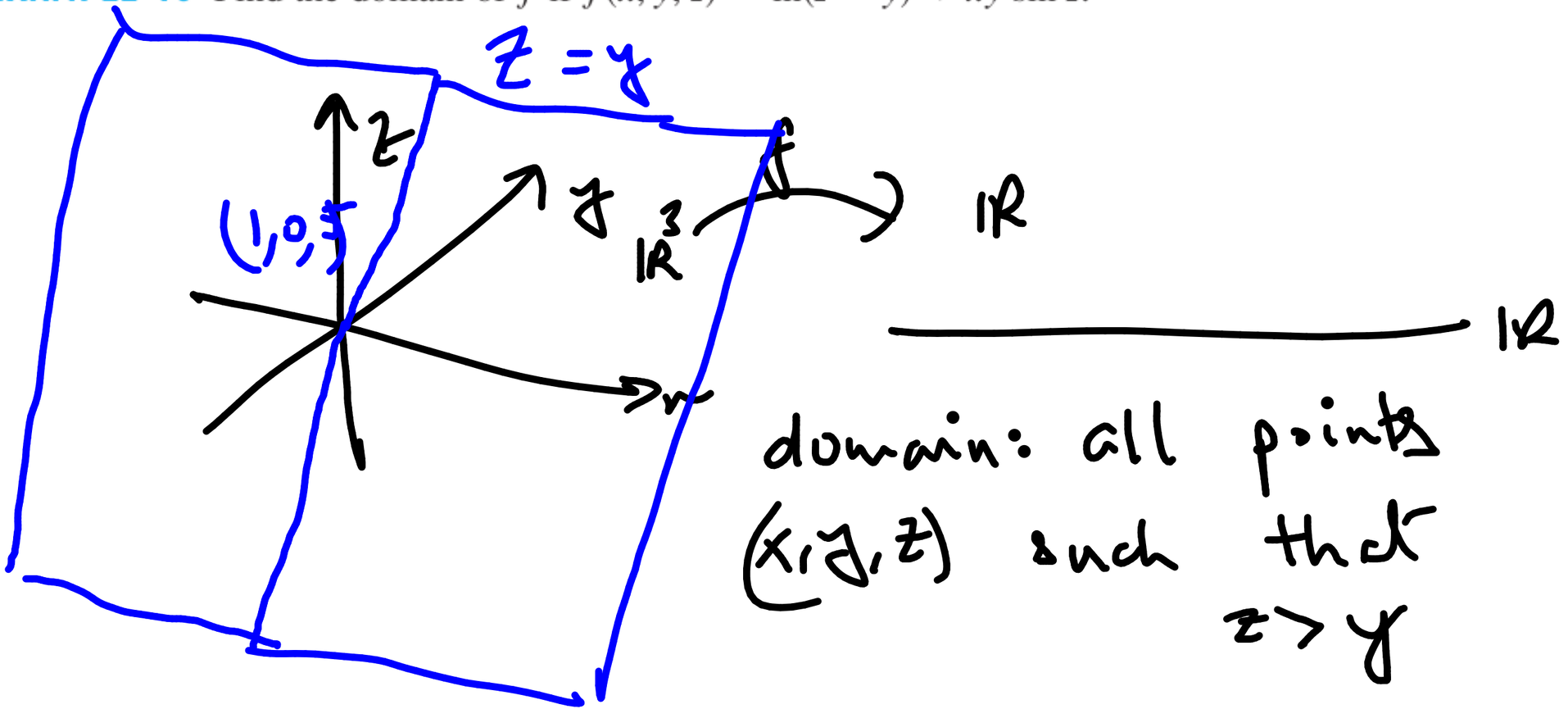


a) Level curves of $f(x, y) = -xye^{-x^2-y^2}$



$-xye^{x^2-y^2}$

EXAMPLE 10 Find the domain of f if $f(x, y, z) = \ln(z - y) + xy \sin z$.



domain: all points (x, y, z) such that $z > y$

above the plane $z = y$

EXAMPLE 11 Find the level surfaces of the function $f(x, y, z) = x^2 + y^2 + z^2$.

$f(x,y) = c$

level curve

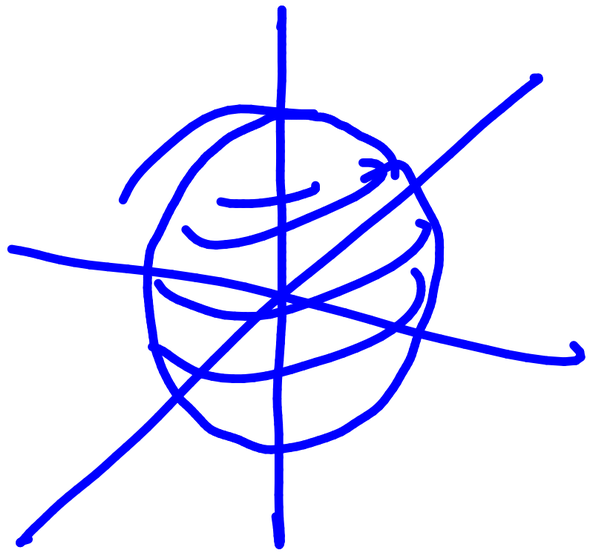
$f(x,y,z) = c$

surface

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

family of spheres

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

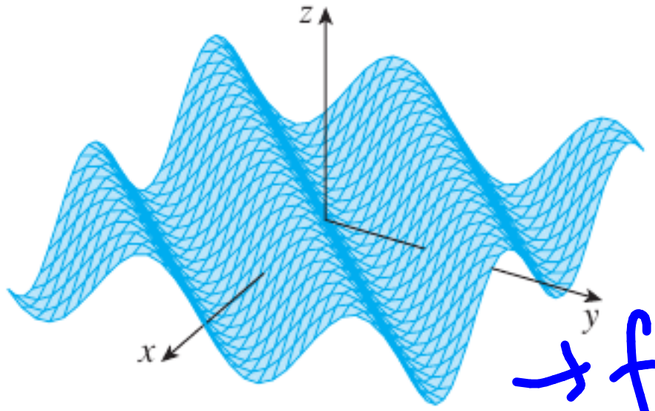


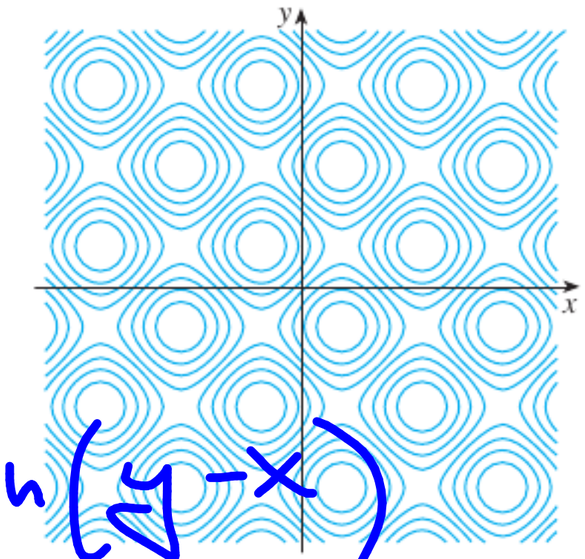
$x^2+y^2+z^2 = c$

graph is 4d

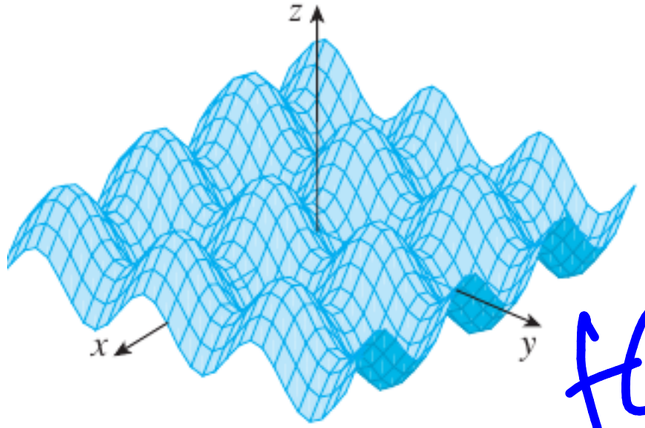
$(x, y, z, f(x,y,z))$

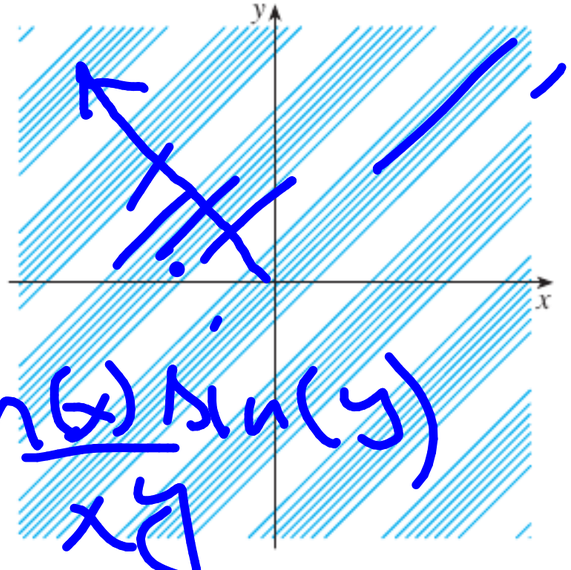
Match the function





$\rightarrow f(x,y) = \sin(y-x)$





$y - x = C$

$f(x,y) = \dfrac{\sin(x)\sin(y)}{xy}$

a. $f(x,y) = \sqrt{xy}$ $xy \geq 0$