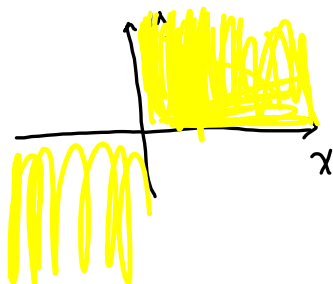


More problems from 14.1

Example 1: Sketch the domain of $f(x, y) = \sqrt{xy}$



$$xy \geq 0$$

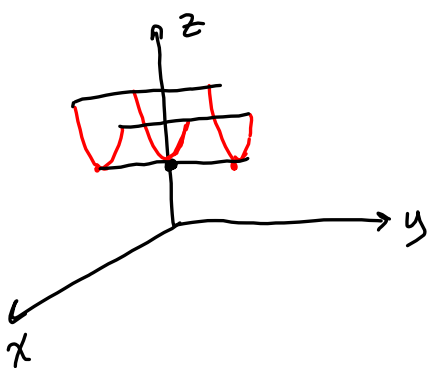
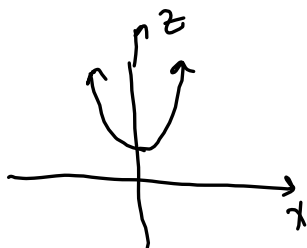
Q I + Q III

including x + y axis.

Example 2: Sketch the graph of

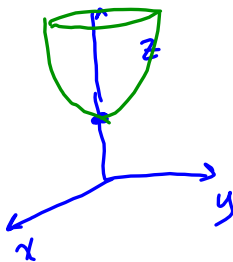
a.) $f(x, y) = x^2 + 7$

$$z = x^2 + 7$$



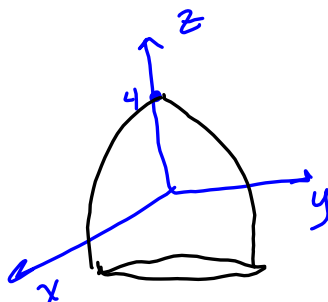
b.) $f(x, y) = x^2 + y^2 + 8$

$$z = x^2 + y^2 + 8$$



c.) $f(x, y) = 4 - x^2 - y^2$

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

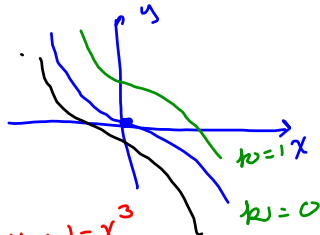


Example 3: Draw a contour map (showing several level curves) for

a.) $f(x, y) = x^3 + y$ Level curves are of the form $z = k$

① $z = 0$ (same as saying $k=0$)

$0 = x^3 + y$
 $y = -x^3$



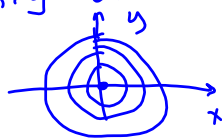
② $z = 1$

$1 = x^3 + y \rightarrow y = 1 - x^3$

③ $z = -1$

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

Level curves family of circles



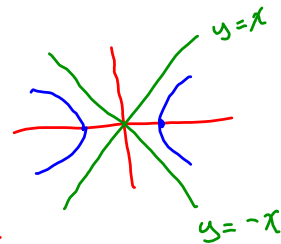
c.) $f(x, y) = \sqrt{x^2 - y^2}$

$z = \sqrt{x^2 - y^2}$

$k = 0 \rightarrow 0 = \sqrt{x^2 - y^2}$

$0 = x^2 - y^2$

$y^2 = x^2 \rightarrow y = \pm x$



$k = 1 \rightarrow 1 = \sqrt{x^2 - y^2} \rightarrow \boxed{1 = x^2 - y^2}$

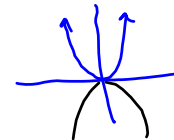
~~$k = -1 \rightarrow -1 = \sqrt{x^2 - y^2} \rightarrow -1 = x^2 - y^2$~~

d.) $f(x, y) = \frac{y}{x^2}$

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

$z = k$

$k > 0: k = \frac{y}{x^2} \rightarrow y = kx^2$



$k < 0: y = \underline{\underline{kx^2}}$