Math 253 LP 17 - 9.6 Functions and Surfaces

Name: Solutions

1. Let $f(x,y) = 1 + \sqrt{4 - y^2}$. Evaluate $f(3,1)$, then find the domain and range of f.

$f(3,1) = 1 + \sqrt{4-1} = 1+\sqrt{3}$

$D: \{(x,y) \mid -2 \le y \le 2\}$ $R = \{z \mid 1 \le z \le 3\}$

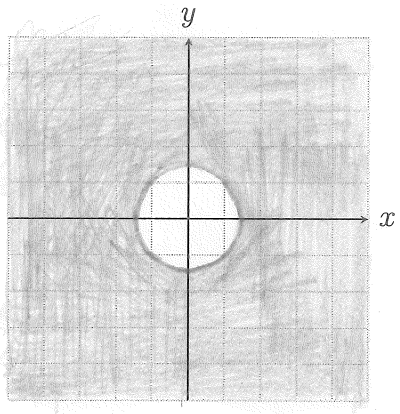
2. Find and sketch the domain of $f(x,y) = \ln(x^2 + y^2 - 2)$.

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

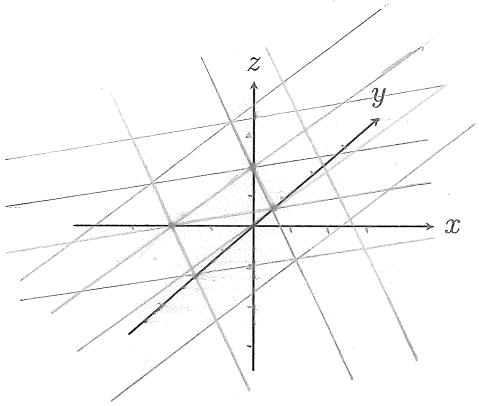
$x^2+y^2 > 2$

$r^2 > 2$

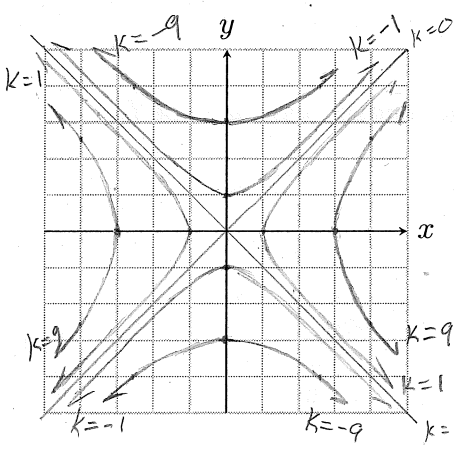
$r > \sqrt{2}$



3. Sketch a graph of $f(x,y) = 2 + x - 3y$.

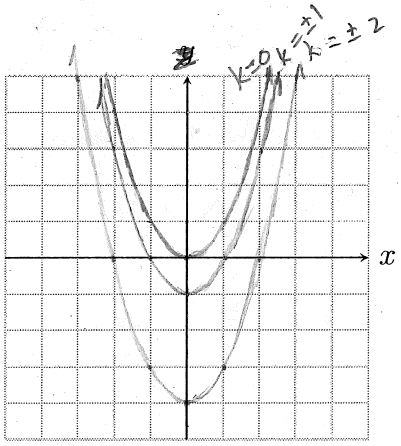


4. Use traces to sketch the graph of $f(x, y) = x^2 - y^2$

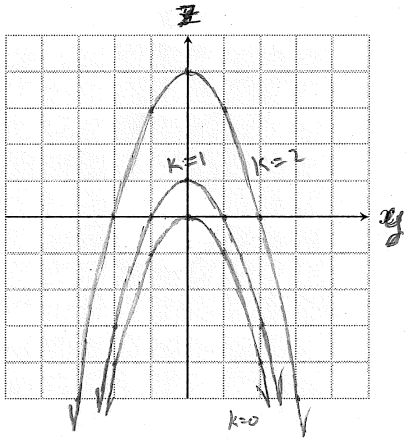


$x^2 - y^2 = k$

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

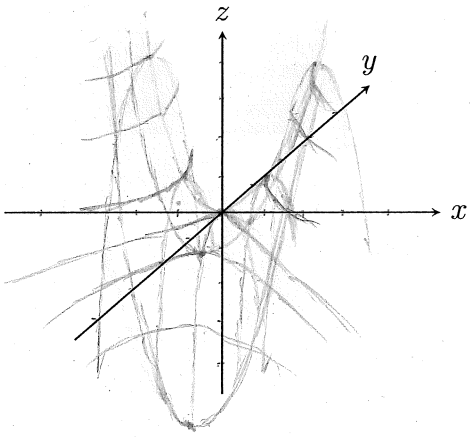


$z = x^2 - k^2$



$z = k^2 - y^2$

$= -y^2 + k^2$



5. Classify $x^2 + 2z^2 - 6x - y + 10 = 0$ from one of the standard forms shown on the next page.

$x^2 - 6x + 2z^2 = y - 10$

$+9 \qquad +9$

$(x-3)^2 + 2z^2 = y - 1$

$\frac{(x-3)^2}{1} + \frac{z^2}{1/2} = \frac{y-1}{1}$

Elliptic paraboloid

center/vertex @ (3, 1, 0)

with center axis parallel to y-axis.

z-values are a factor of $\sqrt{1/2}$ smaller than the basic $x^2 + z^2 = y$ graph