

#13-19 Find and sketch the domain

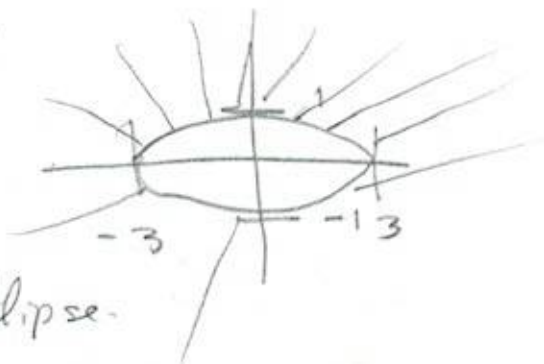
(13) $f(x, y) = \ln(9 - x^2 - 9y^2)$

Need $9 - x^2 - 9y^2 > 0 \rightarrow$

$x^2 + 9y^2 < 9 \rightarrow$

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

$D =$ interior of the ellipse.



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

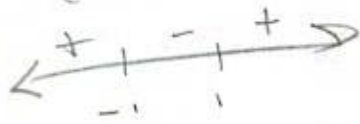
Need $1-x^2 \geq 0$ and $1-y^2 \geq 0$

$x^2 - 1 \leq 0$

$y^2 - 1 \leq 0$

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

$(y-1)(y+1) \leq 0$

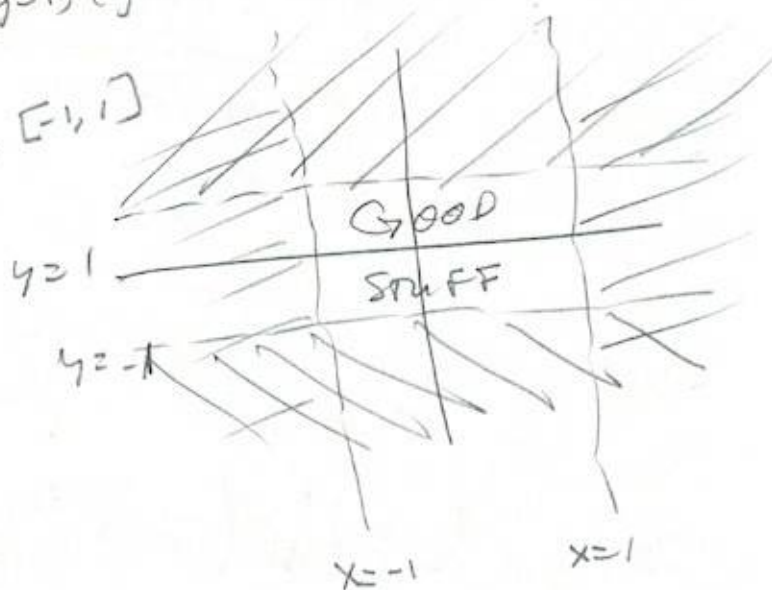


$x \in [-1, 1]$

$y \in [-1, 1]$

Closed square $\{$

$\{ (x, y) \mid x \in [-1, 1], y \in [-1, 1] \}$

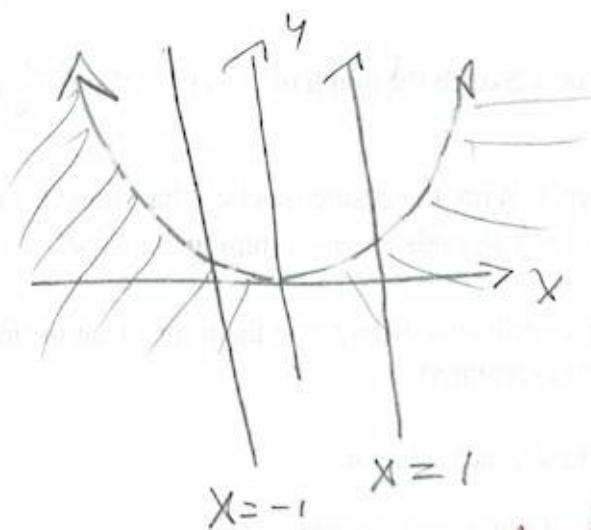


(17) $f(x,y) = \frac{\sqrt{y-x^2}}{1-x^2}$

$y-x^2 \geq 0$ $1-x^2 \neq 0$

$y \geq x^2$ and $x \neq \pm 1$

Everything above or on $y=x^2$, excluding vertical lines $x=\pm 1$.



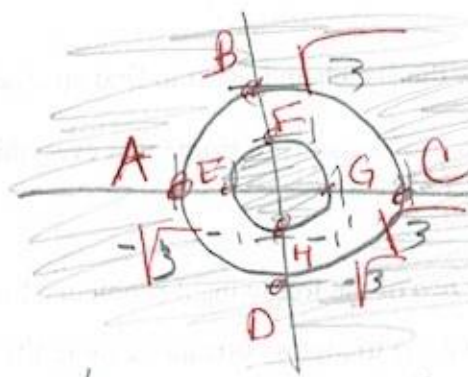
(18) $f(x,y) = \arcsin(x^2+y^2-2)$

Need $|x^2+y^2-2| \leq 1$

$-1 \leq x^2+y^2-2 \leq 1$

$1 \leq x^2+y^2 \leq 3$

The annulus between two circles. Include the circles, themselves.



- A = $(-\sqrt{3}, 0)$
- B = $(0, \sqrt{3})$
- C = $(\sqrt{3}, 0)$
- D = $(0, -\sqrt{3})$
- E = $(-1, 0)$
- F = $(0, 1)$
- G = $(1, 0)$
- H = $(0, -1)$

(19) $f(x,y,z) = \sqrt{1-x^2-y^2-z^2}$

Need $1-x^2-y^2-z^2 \geq 0$

$\rightarrow x^2+y^2+z^2 \leq 1$

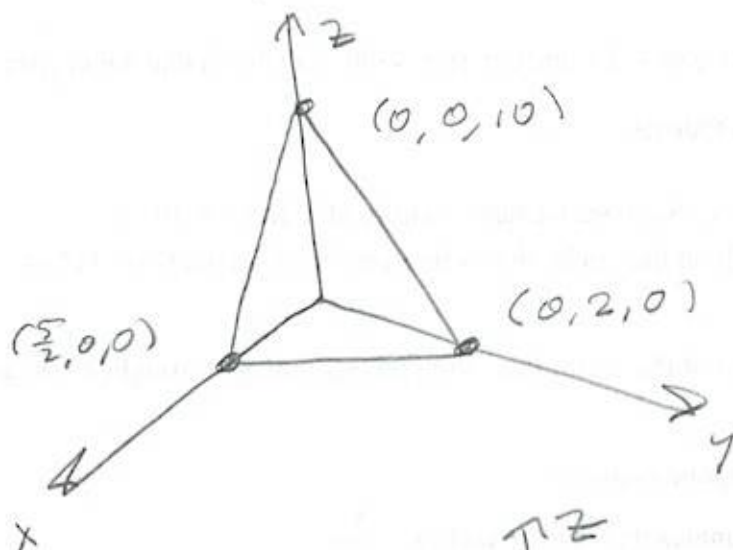
closed sphere of radius 1, centered at the origin



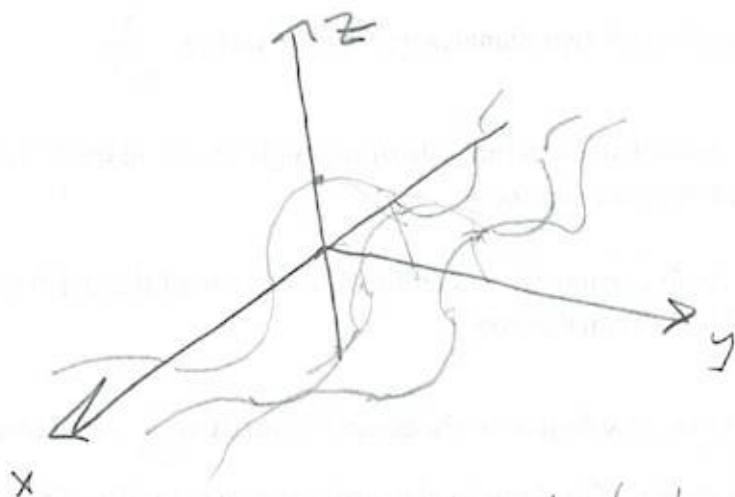
#s 23-4 sketch function

(23) $f(x,y) = 10 - 4x - 5y = z$

$(0,0,10), (\frac{5}{2}, 0, 0), (0,2,0)$



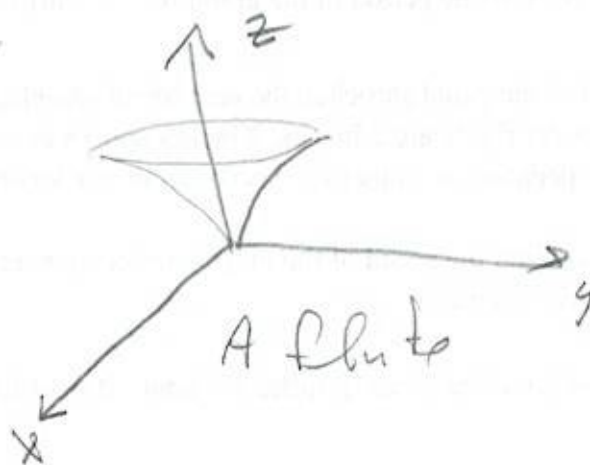
(24) $f(x,y) = \cos(x)$



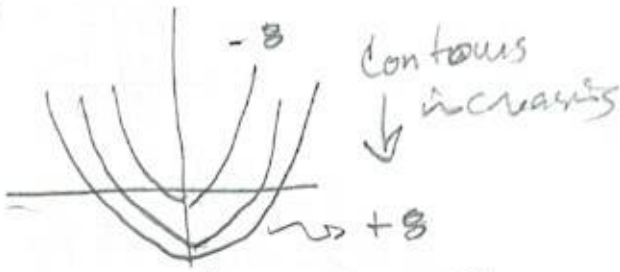
35-38 Use given contour map to sketch f .

(35)

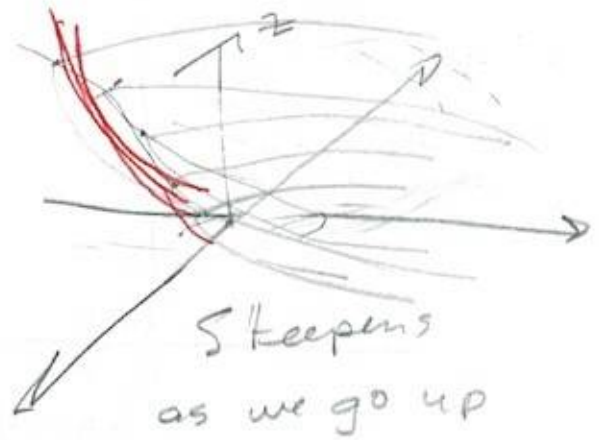
Increasing z contours
farther apart
as we go "up"



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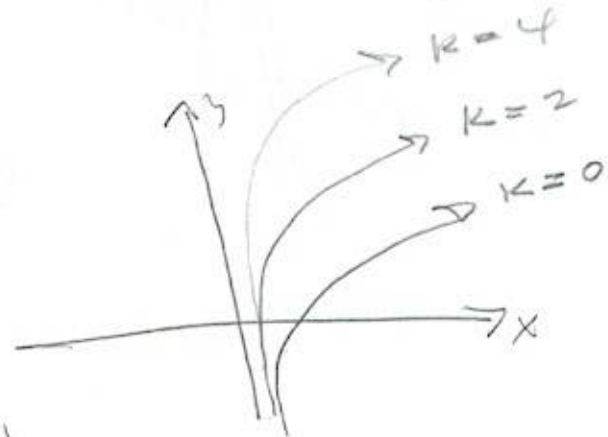
Contours closer as we go "up"



41) $f(x, y) = y - \ln x$

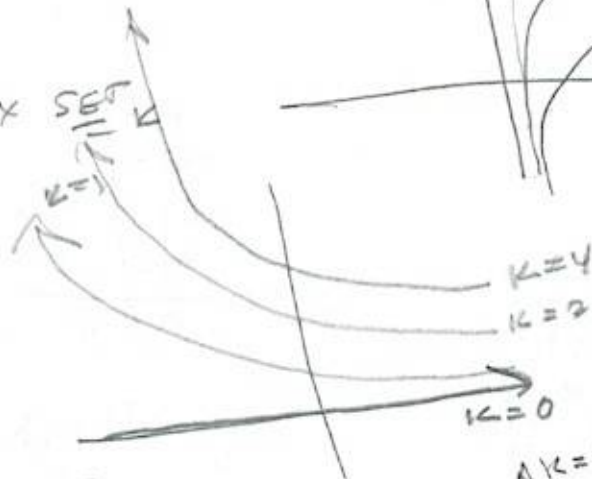
$y - \ln x = k \rightarrow$

$y = \ln x + k$



43) $f(x, y) = y e^x$

$y = k e^{-x}$



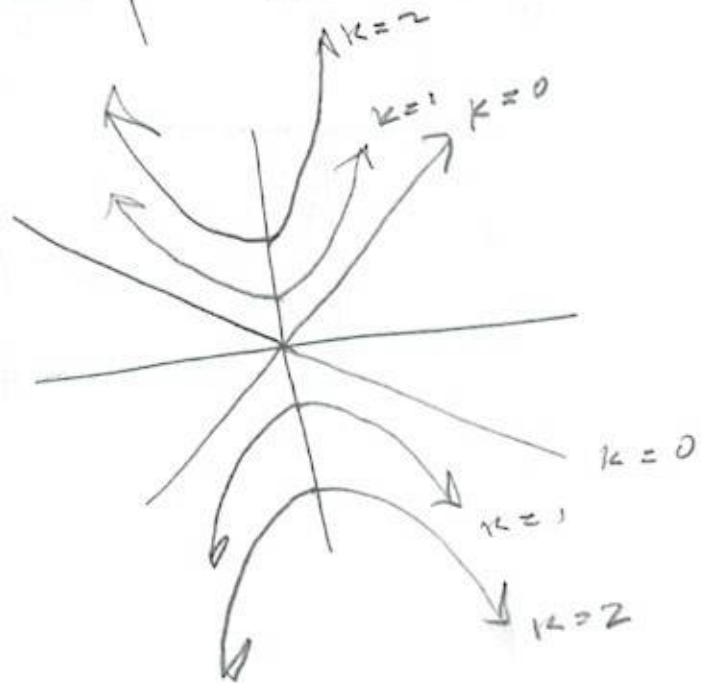
45) $f(x, y) = \sqrt{y^2 - x^2} = k$

$y^2 - x^2 = k^2$

$y^2 = x^2 + k^2$

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

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



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#551-4 Computer graph

(53) $z = xy^2 - x^3$ monkey saddle

(54) $z = xy^3 - yx^3$ dog saddle

#555-60 Match with graph & contour plot.

(55) $z = \sin(xy)$

(56) $z = e^x \cos y$

(57) $z = \sin(x-y)$

(58) $z = \sin x - \sin y$

(59) $z = (1-x^2)(1-y^2)$

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