

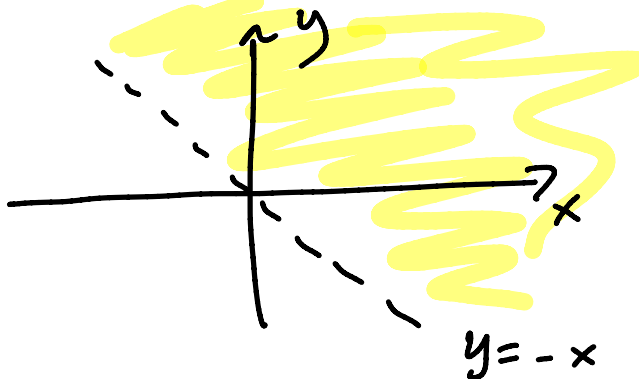
Name: Soln

There are 20 points possible on this quiz. This is a closed book quiz and closed note quiz. Calculators are not allowed. If you have any questions, please raise your hand.

1. (4 points) Find and sketch the domain of the function  $f(x, y) = \frac{x-y}{\sqrt{x+y}}$ .

Need  $x+y > 0$ . or  $y > -x$

domain:  $\{(x, y) \mid y > -x\}$



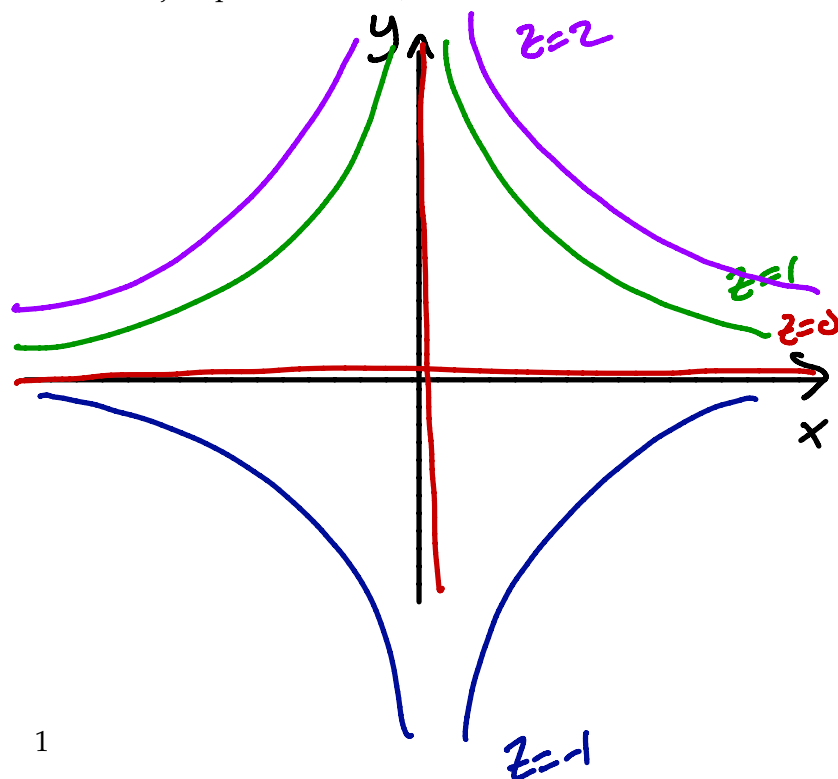
2. (4 points) Draw a contour map of the function  $f(x, y) = x^2y$  showing several level curves. (Make sure to include a variety of level curves – not just positive ones.)

$$z = -1: -1 = x^2y \text{ or } y = \frac{-1}{x^2} \quad a$$

$$z = 0: 0 = x^2y \text{ or } (x=0 \text{ or } y=0) \quad o$$

$$z = 1: 1 = x^2y \text{ or } y = \frac{1}{x^2} \quad o$$

$$z = 2: 2 = x^2y \text{ or } y = \frac{2}{x^2} \quad a$$



3. (2 points) Describe the level surfaces of the function  $f(x, y, z) = 3x + 2y + z$ . (A description in words is sufficient. You may choose to make a little sketch if you like but it is not required.)

$$C = 3x + 2y + z \leftarrow \text{plane.}$$

So level surfaces look like a collection of parallel planes.

4. (5 points each) Find the limit, if it exists or show that the limit does not exist.

$$\begin{aligned} \text{(a)} \quad \lim_{(x,y) \rightarrow (\pi, \pi/2)} x \sin(x-y) &= \pi \sin\left(\pi - \frac{\pi}{2}\right) \\ &= \pi \end{aligned}$$

$$\text{(b)} \quad \lim_{(x,y) \rightarrow (0,0)} \frac{xy^2 \cos(y)}{x^2 + y^4} = \text{DNE}, \text{ because the two limits below are not equal.}$$

along  $y=0$ :

$$\lim_{x \rightarrow 0} \frac{0}{x^2} = 0$$

along  $x=y^2$ :

$$\lim_{y \rightarrow 0} \frac{y^4 \cos(y)}{2y^4} = \lim_{y \rightarrow 0} \frac{1}{2} = \frac{1}{2}$$