

Quiz 4

MATH 32A-3, CALCULUS OF SEVERAL VARIABLES, FALL 2016

SECTION: 3A 3B 3C 3D 3E 3F (CIRCLE ONE)

NAME: HIE KAI LIM

You have 10 minutes to solve the following problems. Show all of your work. To receive full credit, your answer must be neatly written and logically organized.

Problem 1. (5 points) Draw a contour map of

$$f(x, y) = x^2 - y$$

for $z = 0, 1$ and 2 .

$$\textcircled{1} x^2 - y = 0$$

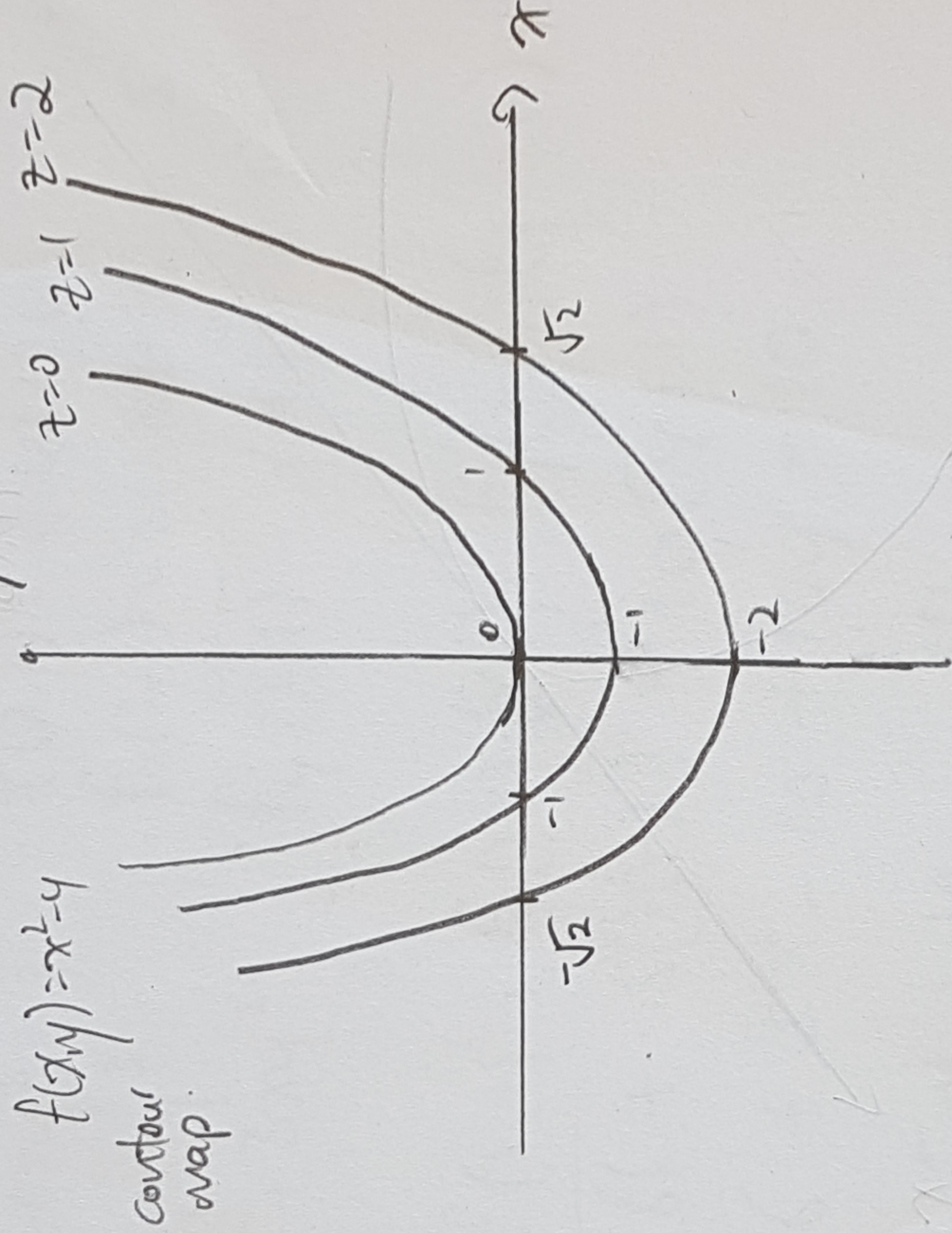
$$\textcircled{2} -x^2 - y = 0$$

$$x^2 - y = 1$$

$$\textcircled{3} -x^2 - 1 = y$$

$$x^2 - y = 2$$

$$\textcircled{3} -y = x^2 - 2$$



Problem 2. (5 points.) Is the function

$$f(x, y) = \begin{cases} \frac{x^2}{x^2+y^2} & \text{for } (x, y) \neq (0, 0) \\ 0 & \text{for } (x, y) = (0, 0) \end{cases}$$

continuous at $(0, 0)$? Justify your answer.

$$f(x, y) = \frac{x^2}{x^2+y^2}, (x, y) \neq (0, 0)$$

let $y = mx$ (ie path through $(0, 0)$ of $y = mx$)

$$f(x) = \frac{x^2}{x^2 + (m^2x^2)}$$

$$= \frac{x^2}{x^2(1+m^2)}$$

$$= \frac{1}{1+m^2}$$

$$\lim_{x \rightarrow 0} f(x) = \frac{1}{1+m^2}$$

\therefore as $x \rightarrow 0$, $f(x)$ has no fixed limits, ie it depends on m , gradient of straight path chosen \therefore it is not continuous at $(0, 0)$