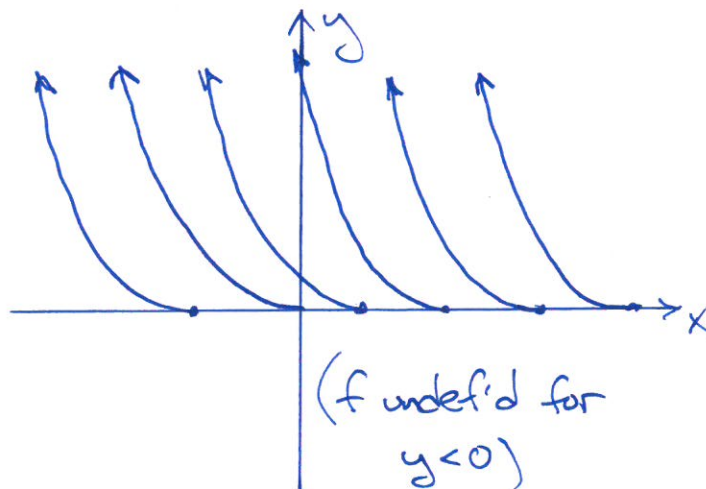


MATH 2650: Quiz #1

- /3
- Problem 1:**
- Sketch a contour map showing several level curves of the function
- $f(x, y) = x + \sqrt{y}$
- .

$$x + \sqrt{y} = C$$

$$\Rightarrow x = C - \sqrt{y}$$



- /4
- Problem 2:**
- Evaluate the partial derivatives
- f_{xx}
- ,
- f_{yy}
- and
- f_{xy}
- for the function
- $f(x, y) = x^4y - 2x^3y^2$
- .

$$f_x = 4x^3y - 6x^2y^2 \quad f_y = x^4 - 4x^3y$$

$$\Rightarrow f_{xx} = 12x^2y - 12xy^2$$

$$f_{yy} = -4x^3$$

$$f_{xy} = f_{yx} = 4x^3 - 12x^2y$$

- /3
- Problem 3:**
- Find the linear approximation of the function
- $f(x, y) = \frac{y-1}{x+1}$
- for
- (x, y)
- near
- $(0, 0)$
- .

$$f_x = -\frac{(y-1)}{(x+1)^2} \Rightarrow f_x(0, 0) = 1$$

$$f_y = \frac{1}{x+1} \Rightarrow f_y(0, 0) = 1$$

$$\therefore L(x, y) = f(0, 0) + f_x(0, 0) \cdot (x-0) + f_y(0, 0)(y-0)$$

$$= \boxed{-1 + x + y}$$