

$$4. f(x, y) = \sqrt{3x^2 + y^2} = (3x^2 + y^2)^{\frac{1}{2}}$$

$$f_x = \frac{1}{2}(3x^2 + y^2)^{\frac{1}{2}-1} \cdot 6x \quad f_y = \frac{1}{2}(3x^2 + y^2)^{\frac{1}{2}-1} \cdot 2y$$

$$= \frac{1}{2}(3x^2 + y^2)^{-\frac{1}{2}} \cdot 6x \quad = \frac{y}{(3x^2 + y^2)^{1/2}}$$

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

$$= \frac{y}{\sqrt{3x^2 + y^2}}$$

$$= \frac{3x}{\sqrt{3x^2 + y^2}}$$

$$3x=0 \quad \sqrt{3x^2 + y^2} = 0$$

$$x=0$$

$$y=0 \quad \sqrt{3x^2 + y^2} = 0$$

REL MIN (0, 0, f(0, 0))

REL MIN (0, 0, 0)

$$\frac{d}{dx}[|u|] = \frac{u}{|u|} \cdot u'$$

$$5. f(x, y) = 2 - |x+3| - |y-1|$$

$$f_x = \frac{-(x+3)}{|x+3|} \cdot 1 \quad f_y = \frac{-(y-1)}{|y-1|} \cdot 1$$

$$f_x = \frac{-x-3}{|x+3|} \quad f_y = \frac{-y+1}{|y-1|}$$

$$-x-3=0 \quad |x+3|=0$$

$$-3=x$$

$$-y+1=0 \quad |y-1|=0$$

$$1=y$$

REL MAX (-3, 1, f(-3, 1))

REL MAX (-3, 1, 2)