QUIZ 5 MATH 232, CALCULUS III, FALL 2016 NAME: SOLUTION

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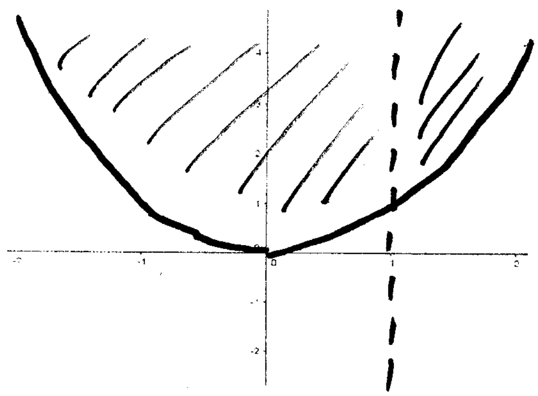
1. Find and sketch the domain of the following function: $f(x, y) = \dfrac{\sqrt{y - x^2}}{1 - x}$



2. Find $\displaystyle\lim_{(x,y)\to(0,0)} \frac{xy^4}{x^2 + y^8}$ along the following paths. Then determine if the limit exists.

(a) $y = 0$

$$\lim_{(x,y)\to(0,0)} \frac{x(0)^4}{x^2+0^8} = \lim_{x\to 0} \frac{0}{x^2} = 0$$

(b) $x = 0$

$$\lim_{(x,y)\to(0,0)} \frac{0(y)^4}{0^2+y^8} = \lim_{y\to 0} \frac{0}{y^8} = 0$$

(c) $x = y^4$

$$\lim_{(x,y)\to(0,0)} \frac{y^4 \cdot y^4}{y^8+y^8} = \lim_{y\to 0} \frac{y^8}{2y^8} = \frac{1}{2}$$

LIMIT DOES NOT EXIST

3. Find the partial derivatives f_x and f_y of $f(x, y) = 2^x y^3 + y\ln(xy)$

$$f_x = (2^x \ln 2)y^3 + y\left(\frac{1}{xy}\cdot y\right) = (2^x \ln 2)y^3 + \frac{y}{x}$$

$$f_y = 2^x(3y^2) + \left[y\left(\frac{1}{xy}\cdot x\right) + (1)\ln(xy)\right]$$

$$= 2^x \cdot 3y^2 + 1 + \ln(xy)$$