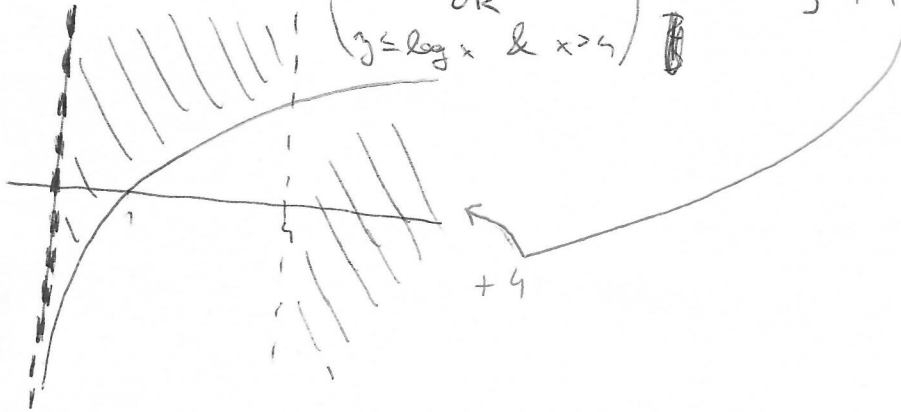


# MIDTERM 1

$$f(x,y) = \sin(xy) + \sin(x^2) \sqrt{\frac{y - \log x}{4-x}}$$

$$D_f: \frac{y - \log x}{4-x} \geq 0 \quad \text{i.e. } x > 0, x \neq 4 \quad \text{OR} \quad y \geq \log x \text{ \& } x < 4$$

$$D_f = \left\{ [x,y] \in \mathbb{R}^2 : \left( \begin{array}{l} y \geq \log x \text{ \& } x < 4 \\ \text{OR} \\ y \leq \log x \text{ \& } x > 4 \end{array} \right) \text{ \& } x > 0 \right\} + 1$$



$$\frac{\partial f}{\partial x} = y + \cos(x^2) \cdot 2x \sqrt{\frac{y - \log x}{4-x}} + \sin(x^2) \frac{1}{2\sqrt{\frac{y - \log x}{4-x}}} \cdot \frac{-\frac{1}{x}(4-x) + (y - \log x)}{(4-x)^2}$$

$$\frac{\partial f}{\partial y} = x + \sin(x^2) \frac{1}{2\sqrt{\frac{y - \log x}{4-x}}} \cdot \frac{1}{4-x} \quad + 4,5$$

$$D_{\frac{\partial f}{\partial x}} = D_{\frac{\partial f}{\partial y}} = \left\{ [x,y] \in \mathbb{R}^2 : x > 0 \text{ \& } \left( \begin{array}{l} y > \log x \text{ \& } x < 4 \\ \text{OR} \\ y < \log x \text{ \& } x > 4 \end{array} \right) \right\} + 0,5$$