

偏导数:

例1: 是什么

求 $z = x^2 + 3xy + y^2$ 的偏导数

解: $z_x = \frac{\partial z}{\partial x} = 2x + 3y$

$$z_y = \frac{\partial z}{\partial y} = 3x + 2y$$

例2: 复合偏导数

求 $z = \sqrt{\ln(xy)}$ 的偏导数

$$z_x = \frac{\partial z}{\partial x} = \frac{1}{2} [\ln(xy)]^{-\frac{1}{2}}$$

$$\frac{1}{2} [\ln(xy)]^{-\frac{1}{2}} \cdot \ln(xy)' \cdot (xy)'$$

$$\frac{1}{2} [\ln(xy)]^{-\frac{1}{2}} \cdot \frac{1}{xy} \cdot y$$

$$z_y =$$

全微分

例1: 计算函数 $z = 2x^2y + xy^2$ 在点 $(1, 2)$ 处的全微分

解: $\frac{\partial z}{\partial x} = 4xy + y^2$ $\frac{\partial z}{\partial y} = 2x^2 + 2xy$

$$\left. \frac{\partial z}{\partial x} \right|_{\substack{x=1 \\ y=2}} = 12, \quad \left. \frac{\partial z}{\partial y} \right|_{\substack{x=1 \\ y=2}} = 6$$

$$dz \Big|_{\substack{x=1 \\ y=2}} = 12dx + 6dy$$

例2: $z = e^{\frac{y}{x}}$ 的全微分

解: $\frac{\partial z}{\partial x} = -\frac{y}{x^2} e^{\frac{y}{x}}$ $\frac{\partial z}{\partial y} =$