12.12交第十次作业答案.

(一)选择题

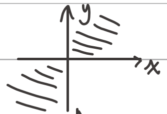
1\. A. $|1-y|\le 1$; $x-y>0$.

2\. D. $f(x+y,x-y)=(x+y)\cdot(x-y)$. $\Rightarrow f(x,y)=xy$

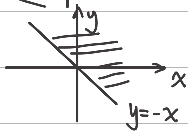
3\. C $z=ye^{x}$ $\frac{\partial z}{\partial x}=ye^{x}$

(二)解答题

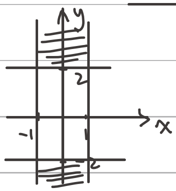
2 (1). $D=\{xy\ge 0\}$ = 第一、三象限含轴



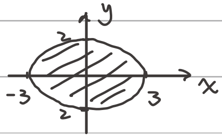
(2) $D=\{x+y>0\}$



(3). $D=\{|x|\le 1\ \ |y|\ge 2\}$.



(4) $D=\{\frac{x^2}{9}+\frac{y^2}{4}\le 1\}$.



3\. (1). $\frac{\partial z}{\partial x}=3x^2y^2$. $\frac{\partial z}{\partial y}=2x^3y$

(2). $\frac{\partial z}{\partial x}=4x^3$. $\frac{\partial z}{\partial y}=3y^2$

(3) $\frac{\partial z}{\partial x}=-\frac{1}{x}$. $\frac{\partial z}{\partial y}=\frac{1}{y}$

(4) $\frac{\partial z}{\partial x}=\frac{y^2}{(x+y)^2}$ $\frac{\partial z}{\partial y}=\frac{x^2}{(x+y)^2}$

(5) $\frac{\partial z}{\partial x}=ye^{xy}+2xy$; $\frac{\partial z}{\partial y}=xe^{xy}+x^2$

(6) $\frac{\partial u}{\partial x}=x(x^2+y^2+z^2)^{-\frac{1}{2}}$. $\frac{\partial u}{\partial y}=y(x^2+y^2+z^2)^{-\frac{1}{2}}$ $\frac{\partial u}{\partial z}=z(x^2+y^2+z^2)^{-\frac{1}{2}}$

(7) $\frac{\partial u}{\partial x}=\frac{z}{y}\cdot x^{\frac{z}{y}-1}$ $\frac{\partial u}{\partial y}=-\frac{z\ln x}{y^2}\cdot x^{\frac{z}{y}}$. $\frac{\partial u}{\partial z}=\frac{\ln x}{y}\cdot x^{\frac{z}{y}}$.

(8). $\frac{\partial u}{\partial x}=\frac{1}{z}-\frac{y}{x^2}$ $\frac{\partial u}{\partial y}=\frac{1}{x}-\frac{z}{y^2}$. $\frac{\partial u}{\partial z}=\frac{1}{y}-\frac{x}{z^2}$

4. (1) $\partial z/\partial x = 4x^3 + 6xy$. $\partial^2 z/\partial x^2 = 12x^2 + 6y$ $\partial^2 z/\partial x\partial y = 6x$

$\partial z/\partial y = 3x^2 + 3y^2$ $\partial^2 z/\partial y^2 = 6y$

(2). $\partial z/\partial x = \ln(x+y) + \frac{x}{x+y}$ $\partial^2 z/\partial x^2 = \frac{1}{(x+y)} + \frac{y}{(x+y)^2}$ $\partial^2 z/\partial x\partial y = \frac{y}{(x+y)^2}$

$\partial z/\partial y = \frac{x}{x+y}$ $\partial^2 z/\partial y^2 = -\frac{x}{(x+y)^2}$

5. $z(x^2, y^2) = \ln(x+y) \triangleq \tilde{z}(x,y)$ 则 $\partial\tilde{z}/\partial x = \partial z/\partial x \cdot \left(\frac{dx^2}{dx}\right) = 2x\,\partial z/\partial x$.

则 $1 = \frac{x+y}{x+y} = \partial\tilde{z}/\partial x + \partial\tilde{z}/\partial y = 2x\,\partial z/\partial x + 2y\,\partial z/\partial y$. 即证所求.

6. $\ln z = y\ln x. \triangleq \tilde{z}(x,y)$. 则 $\partial\tilde{z}/\partial x = \frac{1}{z}\,\partial z/\partial x$ $\partial\tilde{z}/\partial y = \frac{1}{z}\cdot\partial z/\partial y$

$2 = \frac{x}{y}\cdot\frac{y}{x} + \frac{1}{\ln x}\ln x = \frac{x}{y}\cdot\partial\tilde{z}/\partial x + \frac{1}{\ln x}\cdot\partial\tilde{z}/\partial y = \frac{1}{z}\left(\frac{x}{y}\,\partial z/\partial x + \frac{1}{\ln x}\cdot\partial z/\partial y\right)$

即证所求.