例 14.1.5

例 14.1.7

习题 14

2.

$$f(x,y)=\begin{cases}0, & x\text{与}y\text{至少有个是有理数}\\ 1, & \text{otherwise.}\end{cases}$$

$$\lim_{\Delta x\to 0}\frac{f(\Delta x,0)}{\Delta x}=\lim_{\Delta x\to 0}\frac{0}{\Delta x}=0$$ 偏导数存在.

$$\lim_{\Delta y\to 0}\frac{f(0,\Delta y)}{\Delta y}=0$$

3. (1) -2, $\cos 1$

(2) -2

4. (12) $$\frac{\partial u}{\partial x}=z\cdot\left(\frac{x}{y}\right)^{z-1}\cdot\frac{1}{y}=\frac{z}{x}\cdot\left(\frac{x}{y}\right)^{z}$$

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

$$\frac{\partial u}{\partial z}=\left(\frac{x}{y}\right)^{z}\ln\frac{x}{y}.$$

(13). $$\frac{\partial u}{\partial x_i}=\frac{x_i}{\sum_{i=1}^{n}x_i^2+\sqrt{\sum_{i=1}^{n}x_i^2}}$$

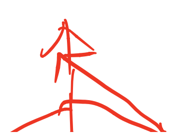
8. $e_r=(\cos\theta,\sin\theta)$

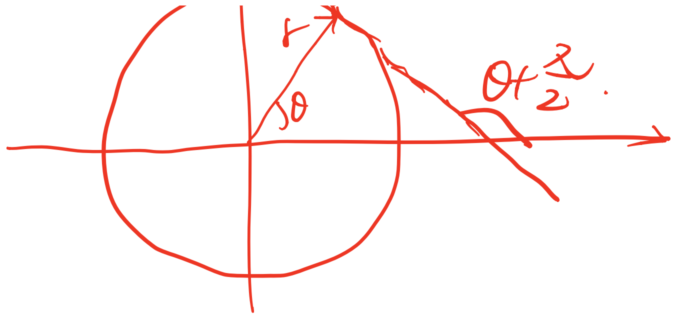
$$\frac{\partial u}{\partial r}=\frac{\partial u}{\partial x}\cdot\frac{\partial x}{\partial r}+\frac{\partial u}{\partial y}\cdot\frac{\partial y}{\partial r}=\cos\theta\,\frac{\partial u}{\partial x}+\sin\theta\,\frac{\partial u}{\partial y}.$$

$$\frac{\partial u}{\partial e_r}=\left(\frac{\partial u}{\partial x},\frac{\partial u}{\partial y}\right)\cdot(\cos\theta,\sin\theta)=\frac{\partial u}{\partial r}.$$

同理 2式.

[illegible]





9. 见讲义.