对于方向$\boldsymbol{l}=(\cos\theta,\sin\theta),t>0$.

3.(1) $f(x,y)=\dfrac{ax+by}{\sqrt{x^2+y^2}}$

$$f(t\cos\theta,t\sin\theta)=\frac{at\cos\theta+bt\sin\theta}{|t|}=a\cos\theta+b\sin\theta$$

于是f沿方向$\boldsymbol{l}=(\cos\theta,\sin\theta)$的极限为$\lim\limits_{t\to0^+}f(t\cos\theta,t\sin\theta)=a\cos\theta+b\sin\theta$

3.(2) $f(x,y)=\dfrac{\sin(xy)}{x^2+y^2}$

$$f(t\cos\theta,t\sin\theta)=\frac{\sin(t^2\sin\theta\cos\theta)}{t^2}$$

于是f沿方向$\boldsymbol{l}=(\cos\theta,\sin\theta)$的极限为$\lim\limits_{t\to0^+}\dfrac{\sin(t^2\sin\theta\cos\theta)}{t^2}=\sin\theta\cos\theta$.

3.(3) $f(x,y)=\dfrac{x^2y^2}{x^2y^2+(x-y)^2}$

$$f(t\cos\theta,t\sin\theta)=\frac{t^2\sin^2\theta\cos^2\theta}{t^2\sin^2\theta\cos^2\theta+(t\cos\theta-t\sin\theta)^2}$$

$$=\frac{t^2\sin^2\theta\cos^2\theta}{t^2\sin^2\theta\cos^2\theta+t^2-2t^2\sin\theta\cos\theta}$$

$$=\frac{\sin^2\theta\cos^2\theta}{\sin^2\theta\cos^2\theta-2\sin\theta\cos\theta+1}$$

于是f沿方向$\boldsymbol{l}=(\cos\theta,\sin\theta)$的极限为$\lim\limits_{t\to0^+}f(t\cos\theta,t\sin\theta)=\dfrac{\sin^2\theta\cos^2\theta}{\sin^2\theta\cos^2\theta-2\sin\theta\cos\theta+1}$

3.(4) $f(x,y)=\dfrac{|x|^\alpha|y|^\beta}{x^2+y^4}\ (\alpha>0,\beta>0)$

$$f(t\cos\theta,t\sin\theta)=\frac{|t\cos\theta|^\alpha|t\sin\theta|^\beta}{(t\cos\theta)^2+(t\sin\theta)^4}=t^{\alpha+\beta-2}\frac{|\cos\theta|^\alpha|\sin\theta|^\beta}{\cos^2\theta+t^2\sin^4\theta}$$

若$\theta=0,\dfrac{\pi}{2},\pi$或$\dfrac{3\pi}{2}$,则$f(t\cos\theta,t\sin\theta)=0$

若$\theta\neq0,\dfrac{\pi}{2},\pi,\dfrac{3\pi}{2}$,

①若$\alpha+\beta>2$,则$f(t\cos\theta,t\sin\theta)=0$

②若$\alpha+\beta=2$,则$f(t\cos\theta,t\sin\theta)=\dfrac{|\cos\theta|^\alpha|\sin\theta|^\beta}{\cos^2\theta+t^2\sin^4\theta}$

$$\lim_{t\to0^+}f(t\cos\theta,t\sin\theta)=\frac{|\cos\theta|^\alpha|\sin\theta|^\beta}{\cos^2\theta}=|\tan\theta|^\beta$$

③若$\alpha+\beta<2$,则$\lim\limits_{t\to0^+}f(t\cos\theta,t\sin\theta)=t^{\alpha+\beta-2}\dfrac{|\cos\theta|^\alpha|\sin\theta|^\beta}{\cos^2\theta+t^2\sin^4\theta}=+\infty$

5.(1)对于方向$\boldsymbol{l}=(\cos\theta,\sin\theta),t>0$.

$$f(t\cos\theta,t\sin\theta)=\frac{t^4\sin^2\theta\cos^2\theta}{(t^2\sin^2\theta+|t\cos\theta|)^3}\leq\frac{t^4\sin^2\theta\cos^2\theta}{\left(2\sqrt{t^3\sin^2\theta|\cos\theta|}\right)^3}=\frac{t^4\sin^2\theta\cos^2\theta}{8(\sin^2\theta|\cos\theta|)^{3/2}}\frac{1}{\sqrt{t}}$$

$$\Rightarrow\lim_{t\to0^+}f(t\cos\theta,t\sin\theta)=0.$$

5.(2) $f(x,y)=\dfrac{x^2y^2}{(x^2+|y|)^3}$,令$y=x^2$,则

$$\lim_{\substack{(x,y)\to(0,0)\\y=x^2}}f(x,y)=\lim_{\substack{(x,y)\to(0,0)\\y=x^2}}\frac{x^6}{(x^2+x^2)^3}=\frac{1}{8}\neq0.$$故全极限不存在.□

$6.(1)f(x,y)=\dfrac{x^2y^2}{x^4+y^4-x^2y^2}$

因为x,y是对称的,所以$\lim\limits_{y\to0}\lim\limits_{x\to0}f(x,y)=\lim\limits_{x\to0}\lim\limits_{y\to0}f(x,y)$.

$$6.(2)\ \lim_{\substack{(x,y)\to(0,0)\\ y=kx}}f(x,y)=\lim_{\substack{(x,y)\to(0,0)\\ y=kx}}\frac{k^2x^4}{x^4+k^4x^4-k^2x^4}=\frac{k^2}{1+k^4-k^2}.\square$$

求全极限和两个累次极限

$7.(2)f(x,y)=\dfrac{\sin(xy)}{x^2+y^2}$

$\lim\limits_{(x,y)\to(0,0)}f(x,y)$不存在,因为$\lim\limits_{\substack{(x,y)\to(0,0)\\ y=kx}}\dfrac{\sin(xy)}{x^2+y^2}=\lim\limits_{\substack{(x,y)\to(0,0)\\ y=kx}}\dfrac{\sin(kx^2)}{x^2+k^2x^2}=\dfrac{k}{1+k^2}$

$$\lim_{x\to0}\lim_{y\to0}f(x,y)=\lim_{x\to0}\lim_{y\to0}\frac{\sin(xy)}{x^2+y^2}=\lim_{x\to0}0=0$$

$$\lim_{y\to0}\lim_{x\to0}f(x,y)=\lim_{y\to0}\lim_{x\to0}\frac{\sin(xy)}{x^2+y^2}=\lim_{y\to0}0=0$$

$7.(4)f(x,y)=\dfrac{x^3+y^2}{x^2+|y|}$

$$|f(x,y)|=\left|\frac{x^3+y^2}{x^2+|y|}\right|=\left|\frac{x(x^2+|y|)-x|y|+y^2}{x^2+|y|}\right|=\left|x+\frac{y^2-x|y|}{x^2+|y|}\right|\le|x|+\left|\frac{y^2-x|y|}{x^2+|y|}\right|$$

$$\le|x|+\left|\frac{y^2-x|y|}{|y|}\right|=|x|+||y|-x|y||\le|x|+|y|+x|y|$$

于是$\lim\limits_{(x,y)\to(0,0)}|f(x,y)|=\lim\limits_{(x,y)\to(0,0)}|x|+|y|+x|y|=0\Rightarrow\lim\limits_{(x,y)\to(0,0)}f(x,y)=0.$

$$\lim_{x\to0}\lim_{y\to0}f(x,y)=\lim_{x\to0}\lim_{y\to0}\frac{x^3+y^2}{x^2+|y|}=\lim_{x\to0}x=0$$

$$\lim_{y\to0}\lim_{x\to0}f(x,y)=\lim_{y\to0}\lim_{x\to0}\frac{x^3+y^2}{x^2+|y|}=\lim_{y\to0}|y|=0$$

$7.(6)f(x,y)=\dfrac{x^4y^4}{(x^2+y^4)^3}$

$\lim\limits_{(x,y)\to(0,0)}f(x,y)$不存在,因为$\lim\limits_{\substack{(x,y)\to(0,0)\\ y=\sqrt{kx}}}\dfrac{x^4y^4}{(x^2+y^4)^3}=\lim\limits_{\substack{(x,y)\to(0,0)\\ y=kx}}\dfrac{k^2x^6}{((1+k^2)x^2)^3}=\dfrac{k^2}{(1+k^2)^3}$

$$\lim_{x\to0}\lim_{y\to0}f(x,y)=\lim_{x\to0}\lim_{y\to0}\frac{x^4y^4}{(x^2+y^4)^3}=\lim_{x\to0}0=0$$

$$\lim_{y\to0}\lim_{x\to0}f(x,y)=\lim_{y\to0}\lim_{x\to0}\frac{x^4y^4}{(x^2+y^4)^3}=\lim_{y\to0}0=0$$

9.(2) $\lim\limits_{\substack{x\to+\infty\\y\to+\infty}}\dfrac{\cos(x^3y^4)}{x^2+y^2}$

$$\left|\frac{\cos(x^3y^4)}{x^2+y^2}\right|\le\frac{1}{x^2+y^2}$$

于是 $\lim\limits_{\substack{x\to+\infty\\y\to+\infty}}\left|\dfrac{\cos(x^3y^4)}{x^2+y^2}\right|\le\lim\limits_{\substack{x\to+\infty\\y\to+\infty}}\dfrac{1}{x^2+y^2}=0\Rightarrow\lim\limits_{\substack{x\to+\infty\\y\to+\infty}}\dfrac{\cos(x^3y^4)}{x^2+y^2}=0.$

9.(4) $\lim\limits_{\substack{x\to+\infty\\y\to0}}\left(1+\dfrac{1}{x}\right)^{\frac{x^3}{x^2+y^2}}$

$$\left(1+\frac{1}{x}\right)^{\frac{x^3}{x^2+y^2}}=\exp\left\{\frac{x^3}{x^2+y^2}\ln\left(1+\frac{1}{x}\right)\right\}=\exp\left\{\frac{x^3}{x^2+y^2}\left(\frac{1}{x}+O\left(\frac{1}{x^2}\right)\right)\right\}=\exp\left\{\frac{x^2+O(x)}{x^2+y^2}\right\}$$

$$\lim_{\substack{x\to+\infty\\y\to0}}\frac{x^2+O(x)}{x^2+y^2}=\lim_{\substack{x\to+\infty\\y\to0}}\frac{x^2}{x^2+y^2}+\lim_{\substack{x\to+\infty\\y\to0}}\frac{O(x)}{x^2+y^2}$$

$$\lim_{\substack{x\to+\infty\\y\to0}}\frac{x^2}{x^2+y^2}=1,\ \lim_{\substack{x\to+\infty\\y\to0}}\frac{O(x)}{x^2+y^2}=0.$$

于是 $\lim\limits_{\substack{x\to+\infty\\y\to0}}\dfrac{x^2+O(x)}{x^2+y^2}=1$

$$\lim_{\substack{x\to+\infty\\y\to0}}\left(1+\frac{1}{x}\right)^{\frac{x^3}{x^2+y^2}}=\exp\left\{\lim_{\substack{x\to+\infty\\y\to0}}\frac{x^2+O(x)}{x^2+y^2}\right\}=e.$$

9.(5) $\lim\limits_{\substack{x\to+\infty\\y\to+\infty}}\left(\dfrac{xy}{x^2+y^2}\right)^{x^2+y^2}$

$$\left(\frac{xy}{x^2+y^2}\right)^{x^2+y^2}=\exp\left\{(x^2+y^2)\ln\left(\frac{xy}{x^2+y^2}\right)\right\}\le\exp\left\{(x^2+y^2)\ln\left(\frac{xy}{2xy}\right)\right\}=\exp\{-(x^2+y^2)\ln2\}$$

于是 $\lim\limits_{\substack{x\to+\infty\\y\to+\infty}}\left(\dfrac{xy}{x^2+y^2}\right)^{x^2+y^2}\le\lim\limits_{\substack{x\to+\infty\\y\to+\infty}}\exp\{-(x^2+y^2)\ln2\}=\exp\left\{-\lim\limits_{\substack{x\to+\infty\\y\to+\infty}}(x^2+y^2)\ln2\right\}=0$

9.(6) $\lim\limits_{(x,y)\to(0,0)}(x^2+y^2)^{x^2y^2}$

$$(x^2+y^2)^{x^2y^2}=\exp\{x^2y^2\ln(x^2+y^2)\}=\exp\left\{\frac{x^2y^2}{x^2+y^2}(x^2+y^2)\ln(x^2+y^2)\right\}$$

于是 $\lim\limits_{(x,y)\to(0,0)}(x^2+y^2)^{x^2y^2}=\exp\left\{\lim\limits_{(x,y)\to(0,0)}\dfrac{x^2y^2}{x^2+y^2}(x^2+y^2)\ln(x^2+y^2)\right\}$

$$=\exp\left\{\lim_{(x,y)\to(0,0)}\frac{x^2y^2}{x^2+y^2}\lim_{(x,y)\to(0,0)}(x^2+y^2)\ln(x^2+y^2)\right\}=1$$

(1) $\lim\limits_{\substack{(x,y)\to(0,0)\\ x\neq y}}\dfrac{x^3+y^3}{x-y}$ 不存在

取 $x=y+ky^3$, 则 $\lim\limits_{\substack{(x,y)\to(0,0)\\ x=y+ky^3}}\dfrac{x^3+y^3}{x-y}=\lim\limits_{\substack{(x,y)\to(0,0)\\ x=y+ky^3}}\dfrac{(y+ky^3)^3+y^3}{ky^3}=\dfrac{2}{k}$

(2) $\lim\limits_{\substack{(x,y)\to(0,0)\\ x+y\neq 0}}\dfrac{x^2y^2}{x^3+y^3}$

$$\left|\frac{x^2y^2}{x^3+y^3}\right|\leq\left|\frac{x^2y^2}{\sqrt{2|x^3y^3|}}\right|=\frac{\sqrt{|xy|}}{\sqrt{2}}$$

$$\lim_{\substack{(x,y)\to(0,0)\\ x+y\neq 0}}\left|\frac{x^2y^2}{x^3+y^3}\right|\leq\lim_{\substack{(x,y)\to(0,0)\\ x+y\neq 0}}\frac{\sqrt{|xy|}}{\sqrt{2}}=0$$

$$\Rightarrow\lim_{\substack{(x,y)\to(0,0)\\ x+y\neq 0}}\frac{x^2y^2}{x^3+y^3}=0.$$

1.(1) $f(x,y)=\begin{cases}\dfrac{\sin(x^2y)}{x^2+y^2}, & (x,y)\neq(0,0)\\ 0, & (x,y)=(0,0)\end{cases}$

在 $(x,y)\neq(0,0)$ 处, $f(x,y)$ 显然连续

只需证 $f(x,y)$ 在 $(0,0)$ 处连续.

$$\left|\frac{\sin(x^2y)}{x^2+y^2}\right|\leq\left|\frac{\sin(x^2y)}{2xy}\right|=\left|\frac{\sin(x^2y)}{2x^2y}\right|\cdot|x|$$

于是 $\lim\limits_{(x,y)\to(0,0)}\left|\dfrac{\sin(x^2y)}{x^2+y^2}\right|\leq\lim\limits_{(x,y)\to(0,0)}\left|\dfrac{\sin(x^2y)}{2x^2y}\right|\cdot|x|=\lim\limits_{(x,y)\to(0,0)}\left|\dfrac{\sin(x^2y)}{2x^2y}\right|\cdot\lim\limits_{(x,y)\to(0,0)}|x|$

$=\dfrac{1}{2}\lim\limits_{(x,y)\to(0,0)}|x|=0$

于是 $\lim\limits_{(x,y)\to(0,0)}\dfrac{\sin(x^2y)}{x^2+y^2}=0\Rightarrow f(x,y)$ 在 $(0,0)$ 处连续.

1.(2) $f(x,y)=\begin{cases}xy\arctan\dfrac{1}{x}\arctan\dfrac{1}{y}, & x\neq 0, y\neq 0\\ 0, & xy=0\end{cases}$

在 $\{(x,y):xy\neq 0\}$ 处, $f(x,y)$ 显然连续

只需证 $f(x,y)$ 在 $\{(x,y):xy=0\}$ 处连续.

$$\lim_{\substack{xy\to 0\\ x\neq 0, y\neq 0}}\left|xy\arctan\frac{1}{x}\arctan\frac{1}{y}\right|\leq\lim_{\substack{xy\to 0\\ x\neq 0, y\neq 0}}\frac{\pi^2}{4}\cdot|xy|=0$$

于是 $\lim\limits_{\substack{xy\to 0\\ x\neq 0, y\neq 0}}xy\arctan\dfrac{1}{x}\arctan\dfrac{1}{y}=0\Rightarrow f(x,y)$ 在 $\{(x,y):xy=0\}$ 处连续.

$2.f(x,y)=\begin{cases}\dfrac{\sin(xy)}{x^2+y^2} & (x,y)\neq(0,0)\\ 0 & (x,y)=(0,0)\end{cases}$

Pf: 固定y, $\lim\limits_{x\to 0}\left|\dfrac{\sin(xy)}{x^2+y^2}\right|\le\lim\limits_{x\to 0}\left|\dfrac{\sin(xy)}{y^2}\right|=0$, 于是$\lim\limits_{x\to 0}\dfrac{\sin(xy)}{x^2+y^2}=0$

固定x, $\lim\limits_{y\to 0}\left|\dfrac{\sin(xy)}{x^2+y^2}\right|\le\lim\limits_{y\to 0}\left|\dfrac{\sin(xy)}{x^2}\right|=0$, 于是$\lim\limits_{y\to 0}\dfrac{\sin(xy)}{x^2+y^2}=0$

但是取$x=y$, 则 $\lim\limits_{\substack{(x,y)\to(0,0)\\ x=y}}\dfrac{\sin(xy)}{x^2+y^2}=\lim\limits_{\substack{(x,y)\to(0,0)\\ x=y}}\dfrac{\sin(x^2)}{2x^2}=\dfrac{1}{2}\neq 0\Rightarrow f(x,y)$不是连续函数.□

$3.f(x,y)=\begin{cases}\dfrac{x^2y}{x^4+y^2} & (x,y)\neq(0,0)\\ 0 & (x,y)=(0,0)\end{cases}$

$\forall 0\le\theta<2\pi$, $\lim\limits_{t\to 0}f(t\cos\theta,t\sin\theta)=\lim\limits_{t\to 0}\dfrac{t^3\cos^2\theta\sin\theta}{t^4\cos^4\theta+t^2\sin^2\theta}=\lim\limits_{t\to 0}\dfrac{t\cos^2\theta\sin\theta}{t^2\cos^4\theta+\sin^2\theta}$

若$\theta=0$或π, 则 $\dfrac{t\cos^2\theta\sin\theta}{t^2\cos^4\theta+\sin^2\theta}=0\Rightarrow\lim\limits_{t\to 0}\dfrac{t\cos^2\theta\sin\theta}{t^2\cos^4\theta+\sin^2\theta}=0$

若$\theta\neq 0,\pi$, 则$\lim\limits_{t\to 0}\left|\dfrac{t\cos^2\theta\sin\theta}{t^2\cos^4\theta+\sin^2\theta}\right|\le\lim\limits_{t\to 0}\left|\dfrac{t\cos^2\theta\sin\theta}{\sin^2\theta}\right|=\lim\limits_{t\to 0}\left|\dfrac{t\cos^2\theta}{\sin\theta}\right|=0$

$\Rightarrow\lim\limits_{t\to 0}\dfrac{t\cos^2\theta\sin\theta}{t^2\cos^4\theta+\sin^2\theta}=0.$

但是 $\lim\limits_{\substack{(x,y)\to(0,0)\\ y=x^2}}\dfrac{x^2y}{x^4+y^2}=\lim\limits_{\substack{(x,y)\to(0,0)\\ y=x^2}}\dfrac{x^4}{x^4+x^4}=\dfrac{1}{2}\neq 0\Rightarrow f$在$O(0,0)$不连续.□

5.(1) 存在$N>0$, 使得对于任意$|x|\ge N$, 都有$a-1\le f(x)\le a+1$.

而连续函数f在有界闭集$\{x\in\mathbb{R}^m:|x|\le N\}$有界.

故$|f(x)|\le\max\left\{\sup\limits_{|x|\le N}|f(x)|,|a-1|,|a+1|\right\},\forall x\in\mathbb{R}^m\Rightarrow f(x)$在$\mathbb{R}^m$有界.

5.(2) $\forall\epsilon>0$, $\exists N>0$, $s.t.\ \forall|x|\ge N$, 有$|f(x)-a|<\dfrac{\epsilon}{2}$

由于f在有界闭集$\{x\in\mathbb{R}^m:|x|\le N+1\}$连续, 则$f$在有界闭集$\{x\in\mathbb{R}^m:|x|\le N+1\}$一致连续

于是$\exists 0<\delta<\dfrac{1}{2}$, $s.t.\ \forall|x-y|<\delta$, $|x|\le N+1$, $|y|\le N+1$, 有$|f(x)-f(y)|<\epsilon$.

$\forall|x|\ge N$, $|y|\ge N$, 有$|f(x)-f(y)|\le|f(x)-a|+|a-f(y)|\le\dfrac{\epsilon}{2}+\dfrac{\epsilon}{2}=\epsilon$.

于是$\forall x,y\in\mathbb{R}^m$, $|x-y|<\delta$, 有$|f(x)-f(y)|<\epsilon$.□

8.(1)**Pf:**取$\lambda=\dfrac{1}{|x|}$,$\forall x\in\mathbb{R}^m-\{0\}$.

则$f\left(\dfrac{x}{|x|}\right)=\dfrac{1}{|x|^{\mu}}f(x)$,其中$\left|\dfrac{x}{|x|}\right|=1$.

考虑有界闭集$\{x\in\mathbb{R}^m:|x|=1\}$,由于$f$在$\mathbb{R}^m-\{0\}\supseteq\{x\in\mathbb{R}^m:|x|=1\}$连续,

故$f(x)$在$\{x\in\mathbb{R}^m:|x|=1\}$上取到最大值和最小值,

于是$|f(x)|\le\max\limits_{|x|=1}|f(x)|$,$\forall x\in\{x\in\mathbb{R}^m:|x|=1\}$.

于是$|f(x)|=\left|f\left(\dfrac{x}{|x|}\right)\right|\cdot|x|^{\mu}\le\max\limits_{|x|=1}|f(x)|\cdot|x|^{\mu}$.取$C=\max\limits_{|x|=1}|f(x)|$即可.□

8.(2)$f(x)$在$\{x\in\mathbb{R}^m:|x|=1\}$上取到最小值$\min\limits_{|x|=1}f(x)>0$.

于是$f(x)=f\left(\dfrac{x}{|x|}\right)\cdot|x|^{\mu}\ge\min\limits_{|x|=1}f(x)\cdot|x|^{\mu}$.取$c=\min\limits_{|x|=1}f(x)$即可.□

9.(1)由于S^1是$\mathbb{R}^2$上的有界闭集,故显然连续的$f(x,y)$在S^1上有最大值和最小值.

9.(2)在S^1上取一个点$(\cos\theta,\sin\theta)$,$\theta\in[0,2\pi)$使得$f(\cos\theta,\sin\theta)=a$

在S^1上取一个点$(\cos\gamma,\sin\gamma)$,$\gamma\in[0,2\pi)$使得$f(\cos\gamma,\sin\gamma)=b$

由于$a<b$,显然$\theta\ne\gamma$,不妨设$\theta<\gamma$

考虑函数$\begin{cases} g(t)=f(\cos(\theta+(\gamma-\theta)t),\sin(\theta+(\gamma-\theta)t)) \\ h(t)=f(\cos(\gamma+(2\pi+\theta-\gamma)t),\sin(\gamma+(2\pi+\theta-\gamma)t)) \end{cases}$ 显然连续

$g(0)=h(1)=f(\cos\theta,\sin\theta)=a$,$g(1)=h(0)=f(\cos\gamma,\sin\gamma)=b$

由连续函数介值性可知:$\forall c\in(a,b)$,存在$t_1,t_2\in(0,1)$,$s.t.\,g(t_1)=h(t_2)=c$

而$(\cos(\theta+(\gamma-\theta)t_1),\sin(\theta+(\gamma-\theta)t_1))\in\{(\cos x,\sin x):\theta<x<\gamma\}$

$(\cos(\gamma+(2\pi+\theta-\gamma)t_2),\sin(\gamma+(2\pi+\theta-\gamma)t_2))\in\{(\cos x,\sin x):\gamma<x<2\pi+\theta\}$

$\{(\cos x,\sin x):\theta<x<\gamma\}\cap\{(\cos x,\sin x):\gamma<x<2\pi+\theta\}=\varnothing$.

于是$(\cos(\theta+(\gamma-\theta)t_1),\sin(\theta+(\gamma-\theta)t_1))\ne(\cos(\gamma+(2\pi+\theta-\gamma)t_2),\sin(\gamma+(2\pi+\theta-\gamma)t_2))$.

故得证!□