中国科学院大学

601

2001–2023

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- NiYanhhhhh
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$\LaTeX$ https://gitee.com/ylxdxx/AM601-kaoyan

2023

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1. 150 , 180

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(1) $f\left(\ln\left(\sqrt{x^2+1}+x\right)\right)=\sqrt{x^2+1}-x,$ $f^{-1}(x)$ ( )

A. $\ln\frac{1}{x}$ B. $\ln\frac{1}{\sqrt{x}}$ C. $e^{\frac{1}{x}}$ D. $e^{\frac{1}{\sqrt{x}}}$

(2) $\lim\limits_{x\to 0}\left(\frac{2^x+3^x}{2}\right)^{2/x}$ ( )

A. e B. 6 C. $\sqrt{6}$ D. $\sqrt{e}$

(3) $\rho=e^{\theta}$ $\theta=\frac{\pi}{2}$ $(\rho,\theta)=\left(e^{\frac{\pi}{2}},\frac{\pi}{2}\right)$ ( )

A. $x-y=0$ B. $x-y=1$ C. $x+y=e^{\frac{\pi}{2}}$ D. $x+y=e^{2\pi}$

(4) $xe^x=1$ ( )

A. 0 B. 1 C. 2 D. 4

(5) $\boldsymbol{a}=(0,1,2)$ $\boldsymbol{b}$ $\boldsymbol{a}$ $\boldsymbol{a}\cdot\boldsymbol{b}=2$ $\boldsymbol{b}$ ( )

A. $\cdot\left(0,\frac{1}{3},\frac{2}{3}\right)$ B. $\left(0,\frac{2}{5},\frac{4}{5}\right)$ C. $\left(0,\frac{2}{7},\frac{4}{7}\right)$ D. $\left(0,\frac{2}{9},\frac{4}{9}\right)$

(6) $f(x,y)=\sqrt{|xy|}$ $f(x,y)$ $(0,0)$ ( )

A. B. C. D.

(7) $y=e^{\frac{1}{x^2}}\arctan\frac{x^2+x+1}{(x+1)(x+2)}$ ( )

A. 1 B. 2 C. 3 D. 4

(8) $z=z(x,y)$ $F\left(x+\frac{z}{y},y+\frac{z}{x}\right)=0$ F z $x\frac{\partial z}{\partial x}+y\frac{\partial z}{\partial y}$ ( )

A. $z+xy$ B. $z-xy$ C. 0 D. 1

(9) $\sum\limits_{n=0}^{\infty}\frac{n^n x^n}{(n!)^2}$ r ( )

A. 1 B. 0 C. e D. ∞

(10) $y=c_1e^x+c_2e^{-2x}+xe^x$ ( )

A. $y''-y'-2y=3xe^x$ B. $y''-y'-2y=3e^x$

C. $y''+y'-2y=3e^x$ D. $y''+y'-2y=3xe^x$

$$f(x)=\begin{cases}\frac{\ln\left(1+x^2\right)}{x}+a, & x<0\\ 1/2, & x=0\\ b\cdot\frac{\sin^3 x}{\ln(1+x^3)}, & x>0\end{cases}$$ $x=0$ a b

$y'' + xy' - 2y = 0$

(1) $\sum\limits_{n=0}^{\infty} a_n x^n$

(2)

$\sqrt[x]{y} = \sqrt[y]{x}$ $x > 0$ $y > 0$ $y = f(x)$ $\frac{d^2y}{dx^2}$

u f u $y\frac{\partial u}{\partial x} + x\frac{\partial u}{\partial y} = 0$ $u(x,y) = f\left(x^2 - y^2\right)$

$D: x^2 + y^2 \leqslant 2$ $x \geqslant 0$ $y \geqslant 0$

$$\iint_D x^{\left[1+x^2+y^2\right]} \cdot y\left[1 + x^2 + y^2\right] dxdy$$

$[x]$ x

(1) $y = \ln x$ $y = \ln x$ x

(2) (1) x

$$I=\iint_S x^2ydydz+xy^2dzdx+\left(x^2+2y^2\right)dxdy$$

S $x^2+y^2+z^2=4$

$f(x)$ $[0,1]$ $f(0)=f(1)=0$ $f(x)$ -1 $\exists\xi\in(0,1)$ $f''(\xi)\geqslant 8$

$l:\begin{cases} x^2+y+2z=1 \\ 2x+y+3z=4 \end{cases}$ $P(x,y,z)$ P P

$f(x)$ $[2,4]$ $(2,4)$ 0 $\lim\limits_{x\to 2}\frac{f(2x-2)}{x-2}$

(1) $f(x)$ $(2,4)$ 0

(2) $\exists\xi\in(2,4)$ $\frac{6}{\int_2^4 f(x)dx}=\frac{\xi}{f(\xi)}$

(3) $\xi\in(2,4)$ $\exists\eta\neq\xi$ $\eta\in(2,4)$

$$6f'(\eta)=\frac{\xi}{\xi-2}\int_2^4 f(x)dx$$

2022

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1. 150 , 180
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(1) $f(x)=\arcsin\left(\frac{4}{\pi}x-1\right)$, $f[f(x)]$ ( )

A. $\left[\frac{\pi}{4},\frac{\pi}{2}\right]$ B. $\left[\frac{\pi}{4},\frac{\pi}{2}\right]$ C. $\left[\frac{\pi}{8},\frac{\pi}{4}\right]$ D. $\left[0,\frac{\pi}{2}\right]$

(2) $\lim\limits_{x\to 0}\tan^2 x\left(\frac{1}{\sin x}+\frac{1}{x^2}\right)=$ ( )

A. 0 B. 1 C. 2 D.

(3) $g(x)$, $g(0)=g'(0)=0, f(x)=\begin{cases}\frac{g(x)}{x} & x\neq 0\\ 0 & x=0\end{cases}$, $f(x)$ $f'(x)$ $x=0$ ( )

A. $f(x)$, $f'(x)$ B. $f(x)$, $f'(x)$, $f'(0)$

C. $f(x)$, $f'(0)$ D. $f(x)$

(4) $f(x)=\lim\limits_{n\to+\infty}\frac{e^x+x^{2n}}{2-x^{2n}}$, $f(x)$ ( )

A. -1 B. 1 C. ± 1 D.

(5) : $\frac{x-1}{2}=\frac{y-2}{-2}=\frac{z-3}{-1}$ $\begin{cases}x+2y-3=0\\ 3y+z+2=0\end{cases}$ $\cos\theta$ ( )

A. $\frac{1}{\sqrt{8}}$ B. $\frac{1}{\sqrt{10}}$ C. $\frac{1}{\sqrt{12}}$ D. $\frac{1}{\sqrt{14}}$

(6) $\sum\limits_{n=1}^{+\infty}a_n$, $\sum\limits_{n=1}^{+\infty}(-1)^n a_n$ $\sum\limits_{n=1}^{+\infty}(a_n)^2$ $\sum\limits_{n=1}^{+\infty}\sin(a_n)$ $\sum\limits_{n=1}^{+\infty}\ln(1+a_n)$ ( )

A. 1 B. 2 C. 3 D. 4

(7) : $y=x\sin\frac{1}{x}$ ( )

A. B. C. D.

(8) $f(x,y)=\frac{x^2y^2}{x^2y^2+(x-y)^2}$, $f(x,y)$ $(0,0)$ ( )

A. , B. , C. , D.

(9) $z(x,y)$ $\frac{x}{z}=\ln\frac{z}{y}$, $dz=$ ( )

A. $\frac{z(zdx+ydy)}{z(x+y)}$ B. $\frac{z(ydx+zdy)}{y(x+z)}$ C. $\frac{z(zdx+xdy)}{y(x+z)}$ D. $\frac{z(xdx+ydy)}{z(x+y)}$

(10) ( )

A. $\int_0^{+\infty}\frac{1}{x\left(e^{\frac{x}{2}}-1\right)}dx$ B. $\int_0^{1}(\ln x)^{100}dx$ C. $\int_2^{+\infty}\frac{1}{x\ln x}dx$ D. $\int_0^{+\infty}\frac{1}{1+x+\sin x}dx$

$u(x)=\begin{cases}1, & x>0\\ 0, & x\leq 0\end{cases}$, $\lim\limits_{x\to 0}\left[\frac{1+e^{\frac{1}{x}}}{1-e^{\frac{2}{x}}}+u(x)\right]$

$y(x)$ $y''=e^{2y}+e^y$, $y(0)=0, y'(0)=2$, $y(x)$

$y(x)$ $\begin{cases} x = 1 + t^2 \\ y = \cos t \end{cases}$

(1) $\frac{dy}{dx}$ $\frac{d^2y}{dx^2}$

(2) $\lim\limits_{x\to 1^+} \frac{dy}{dx}$ $\lim\limits_{x\to 1^+} \frac{d^2y}{dx^2}$

: $u(x,y) = f(x)g(y)$ $u\frac{\partial^2 u}{\partial x \partial y} = \frac{\partial u}{\partial x}\frac{\partial u}{\partial y}$

$(x-1)^2 + y^2 = 1$ $y > 0,$ y

$C : \frac{x^2}{4} + \frac{y^2}{9} = 1,$

$$I = \oint_C e^{xy}\{[y\sin(xy) + \cos(x+y)]dx + [x\sin(xy) + \cos(x+y)]dy\}$$

(1) $[-\pi, \pi]$ $f(x) = x$

(2) : $\sum\limits_{n=0}^{+\infty} \frac{(-1)^n}{2n+1} = \frac{\pi}{4}$

$f(x)$ $g(x)$ $[a, b]$, $g''(x) \neq 0$ $f(a) = f(b) = g(a) = g(b) = 0$

(1) $\forall x \in (a, b)$ $g(x) \neq 0$

(2) $\exists \xi \in (a, b)$ $\frac{f(\xi)}{g(\xi)} = \frac{f''(\xi)}{g''(\xi)}$

$I_n = \int_0^1 \frac{x^n}{1+x} dx$

(1) $I_{n+1} = -I_n + \frac{1}{n+1}$

(2) $\lim\limits_{n \to +\infty} I_n = 0$

(3) (1) (2) $\sum\limits_{n=1}^{+\infty} \frac{(-1)^{n-1}}{n} = \ln 2$

$f(x, y, z) = x^2 + y^2 + z^2,$ $ax + by + cz = 1$

2021

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(1) $a=e^x$, $b=1+x$, $c=1+x+x^2$, $x=0$ ϵ , ( )

A. $b\le a\le c$ B. $a\le b\le c$ C. $b\le c\le a$ D.

(2) , $\sin hx=\frac{e^x-e^{-x}}{2}$ $\cosh x=\frac{e^x+e^{-x}}{2}$ $=$ ( )

A. , B. ,

C. , D. $\cosh^2 x-\sinh^2 x=1$, x

(3) n , $\lim\limits_{n\to\to\infty}\cos 2\pi\sqrt{n^2+n}=$ ( )

A. 1 B. 0 C. -1 D.

(4) $f(x)$ $(-1,1)$, $\lim_{x\to 0^+}\frac{f(x)}{x}=a\neq 0$, $f(x)$ $x=0$ ( )

A. a B. $-a$ C. 0 D.

(5) $\vec{a}$ $\vec{b}$ $(\vec{a}+\vec{b})\perp(\vec{a}-2\vec{b})$, $(3\vec{a}-\vec{b})\perp(\vec{a}+2\vec{a})$, $|\vec{a}|$ $|\vec{b}|$ ( )

A. $|\vec{a}|=\sqrt{\frac{1}{2}}|\vec{b}|$ B. $|\vec{a}|=\sqrt{2}|\vec{b}|$ C. $|\vec{a}|=\sqrt{\frac{2}{3}}|\vec{b}|$ D. $|\vec{a}|=\sqrt{\frac{3}{2}}|\vec{b}|$

(6) $I=\lim\limits_{x\to 0}\dfrac{\int_{\sin^3 x\cos x}^{e^{x^2}-1}\arctan\frac{3t}{2+t}dt}{\arcsin x^3}$, ( )

A. I B. $I=3/2$ C. $I=1/2$ D. $I=0$

(7) $a_n>0, \{a_n\}$ 0, $\sum\limits_{n=1}^{\infty}(-1)^{n-1}\sqrt{a_n\cdot a_{n-1}}$ ( )

A. B. C. D.

(8) $Z=xy+xF\left(\frac{y}{x}\right)$, F , $x\frac{\partial z}{\partial x}+y\frac{\partial z}{\partial y}$ ( )

A. $Z-xy$ B. 0 C. $Z+xy$ D. xy

(9) $y''-6y'+8y=e^x+e^{2x}$ ( )

A. ae^x+be^{2x} B. ae^x+bxe^{2x} C. axe^x+be^{2x} D. axe^x+bxe^{2x}

(10) ( )

A. $\lim\limits_{s\to 0}\iint_{s<x^2+y^2<\frac{1}{2}}\frac{dxdy}{(x^2+y^2)\left(\ln\sqrt{x^2+y^2}\right)^2}$ B. $\lim\limits_{s\to 1}\iint_{-\frac{1}{2}<x^2+y^2<s}\frac{dxdy}{(x^2+y^2)\left(\ln\sqrt{x^2+y^2}\right)^2}$

C. $\lim\limits_{s\to 0}\iint_{s<x^2+y^2<\frac{1}{2}}\frac{\left(1+x^2\right)dxdy}{(x^2+y^2)\left(\ln\sqrt{x^2+y^2}\right)^2}$ D.

(10) $xy''-y'\ln y'+y'\ln x=0$, $y(1)=2$ $y'(1)=e^2$

(10) $l_1:\frac{x-1}{2}=\frac{y}{1}=\frac{z+1}{3}$ $l_2:\begin{cases}2x+y-z+1=0\\ x-2y+z-2=0\end{cases}$

(10) $f(x) = \lim_{n\to+\infty} \frac{x^{2n-1}+nx\sin\frac{x}{n}}{x^{2n}+1}$, $f(x)$

(10) $g(x) = \begin{cases} \frac{e^x-1}{x} & x \neq 0 \\ 1 & x = 0 \end{cases}$,$f(x) = g'(x)$ $f^{(n)}(0)$

(10) $\Sigma=\{(x,y,z)\in R^3\mid x^2+y^2+z^2=1\}$,

$$\iint_{\Sigma} y^2zdxdy+x^2ydzdx$$

(10) $\lim_{x\to 0}\frac{ax+\sin x}{\int_b^x\frac{\ln\left(1+t^3\right)}{t}dt}=c,(c\neq 0),$ a,b,c

(10) $f(x,y)=\begin{cases}\frac{\sqrt{|xy|}}{x^2+y^2}\sin\left(x^2+y^2\right) & x^2+y^2\neq 0\\ 0 & x^2+y^2=0\end{cases}$ $f(x,y)$ $(0,0)$

(10) $f(x)=\begin{cases}x & -\pi\leq x\leq 0\\ 0 & 0\leq x\leq\pi\end{cases}$

(10) $f(x)$ $[a,b]$, ab $f(x)$ $\exists\ \xi_1,\xi_2\in(a,b)$ $f'(\xi_1)=\frac{f(b)-f(a)}{b-a}$ $f'\left(\xi_2\right)<\frac{f(b)-f(a)}{b-a}$

(10) $z=f(x,y)$ $dz=2xdx-2ydy$ $f(1,1)=2020;$ $f(x,y)$ $D=\left\{(x,y)\mid x^2+\frac{y^2}{4}\leq 1\right\}$

2020

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(1) $\lim\limits_{n\to+\infty}\left(\frac{2}{n^2}+\frac{4}{n^2+1}+\cdots+\frac{2n}{n^2+n-1}\right)$ ( )

A. 0 B. 1 C. 2 D. $+\infty$

(2) $f(x)$ $x=a$, $F(x)=f(x)|x-a|$, $f(a)=0$ $F(x)$ $x=a$ ( )

A. B. C. D.

(3) $\lim\limits_{x\to\frac{\pi}{2}}(\sin x)^{\frac{1}{1-\sin x}}$ ( )

A. e^{-1} B. 1 C. e D. $+\infty$

(4) $f(x)$ $(-\infty,+\infty)$, 4, $\lim\limits_{x\to0}\frac{f(1)-f(1-x)}{2x}=-1$, $y=f(x)$ $(5,f(5))$ ( )

A. $\frac{1}{2}$ B. 2 C. -1 D. -2

(5) $\vec{a}=(1,2,2),\vec{b}=(0,1,2)$, $\vec{b}$ $\vec{a}$ ( )

A. $\left(0,\frac{6}{5},\frac{12}{5}\right)$ B. $\left(\frac{1}{3},\frac{2}{3},\frac{2}{3}\right)$ C. $\left(0,\frac{1}{\sqrt{5}},\frac{2}{\sqrt{5}}\right)$ D. $\left(\frac{2}{3},\frac{4}{3},\frac{4}{3}\right)$

(6) $f(x,y)$ $(0,0)$ ( )

A. $\lim\limits_{(x,y)\to(0,0)}[f(x,y)-f(0,0)]=0.$

B. $\lim\limits_{x\to0}\frac{f(x,0)-f(0,0)}{x}=0$, $\lim\limits_{y\to0}\frac{f(0,y)-f(0,0)}{y}=0.$

C. $\lim\limits_{(x,y)\to(0,0)}\frac{f(x,y)-f(0,0)}{\sqrt{x^2+y^2}}=0$

D. $\lim\limits_{x\to0}[f'_x(x,0)-f'_x(0,0)]=0$, $\lim\limits_{y\to0}\left[f'_y(0,y)-f'_y(0,0)\right]=0.$

(7) $\sum\limits_{n=1}^{\infty}\frac{1}{n(n+1)(n+2)}=$ ( )

A. 0 B. $\frac{1}{4}$ C. $\frac{1}{3}$ D. 1

(8) $x+y+z=e^{xy}$, $\frac{\partial^2 z}{\partial x^2}+\frac{\partial^2 z}{\partial y^2}$ ( )

A. $(x^2+y^2)\,e^{xy}$ B. $(x+y)e^{xy}$ C. $2xye^{xy}$ D. $(1+xy)e^{xy}$

(9) $a_0=3,a_1=5$, $n>1$ $na_n=\frac{2}{3}a_{n-1}-(n-1)a_{n-1}$, $\sum\limits_{n=0}^{\infty}a_nx^n$ ( )

A. $\frac{2}{3}$ B. 1 C. $\frac{3}{2}$ D. 2

(10) ( )

A. $\int_0^{+\infty}\frac{x^6}{1+e^x}dx$ B. $\int_0^{+\infty}\frac{1}{\sqrt{x}(1+x)}dx$ C. $\int_1^{+\infty}\frac{1}{x^4\ln x}dx$ D. $\int_1^{+\infty}\frac{2\sin^2 x}{1+x^2}dx$

10 $\lim\limits_{x\to0}f(x)$, $\lim\limits_{x\to0}f'(x)$, $\lim\limits_{x\to0}\frac{\sqrt[3]{1+xf(x)}-1}{\sin x}=3$ $\lim\limits_{x\to0}f(x)$

10 $A(-2,1,-1)$, x , $\frac{x-1}{2}=\frac{y+1}{1}=\frac{z}{-1}$

10 $y=f(x)$ $\begin{cases} x^x+tx-t^2=0, \\ \arctan(ty)=\ln\left(1+t^2y^2\right) \end{cases}$ $\frac{dy}{dx}$

10 $u=f(r), r=\ln\sqrt{x^2+y^2+z^2}$ $\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}+\frac{\partial^2 u}{\partial z^2}=\left(x^2+y^2+z^2\right)^{-3/2}$, $f(x)$

10 $C: y=x^3+2x$ 1,3 x D, :

(1) D

(2) D x

10 :

$$I = \iint_S xdydz + 2y^4dxdz + 3z^6dxdy$$

S $x^2 + 4y^2 + 9z^2 = 1$

10 $f(x)$ 3 , 2 $[a, a+2]$ θ, $f(\theta) = f(\theta+1)$

(10 $f(x), g(x)$ $[a, b]$, $f(a) = f(b) = g(a) = 0$. : $\xi \in (a, b)$, $f''(\xi)g(\xi) + 2f'(\xi)g'(\xi) + f(\xi)g''(\xi) = 0$

10 f $[0, 1]$ $\int_0^x f(t)dt \geq 0$ $x \in [0, 1]$ $\int_0^1 f(t)dt = 0$: $\int_0^1 xf(x)dx \leq 0$

10 x, y, z $x^2 + y^2 + z^2 = a$, $a > 0$, $x^3 + y^3 + z^3 \geq \frac{a\sqrt{3a}}{3}$

2019

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(1) $\lim_{n\to\infty}\left[\left(1+\frac{1}{2!}+\frac{1}{3!}+\cdots+\frac{1}{n!}\right)+\left(\frac{1}{1\cdot 3}+\frac{1}{3\cdot 5}+\frac{1}{(2n-1)(2n+1)}\right)\right]$ ( )

A. $e-1/2$ B. $5/2$ C. $e+1/2$ D. $7/2$

(2) $f(x)$ $x=0$ $\lim_{h\to 0}\frac{f(h^2)}{h^2}=1$ ( )

A. $f(0)=0$ $f'_-(0)$ B. $f(0)=1$ $f'_-(0)$

C. $f(0)=0$ $f'_+(0)$ D. $f(0)=1$ $f'_+(0)$

(3) 4 ( )

A. $f'(x)$ $(0,1)$ $f(x)$ $(0,1)$ B. $f(x)$ $(0,1)$ $f(x)$ $(0,1)$

C. $f(x)$ $(0,1)$ $f'(x)$ $(0,1)$ D. $f'(x)$ $(0,1)$ $f(x)$ $(0,1)$

(4) $f(x)=\begin{cases}\dfrac{x\cdot\sin(x^2-1)}{x^2-1} & x\neq\pm 1\\ 1 & x=\pm 1\end{cases}$ ( )

A. $f(x)$ $x=-1$ $x=1$ B. $f(x)$ $x=-1$ $x=1$

C. $f(x)$ $x=-1$ $x=1$ D. $f(x)$ $x=-1$ $x=1$

(5) $\vec{a},\vec{b}$ $(\vec{a}+\vec{b})\perp(\vec{a}-\vec{b})$ $(5\vec{a}+\vec{b})\perp(3\vec{a}-4\vec{b})$ $\vec{a}$ $\vec{b}$ α ( )

A. $\cos\alpha=\frac{14}{17}$ B. $\cos\alpha=\frac{13}{17}$ C. $\cos\alpha=\frac{12}{17}$ D. $\cos\alpha=\frac{11}{17}$

(6) $f(x,y)=\begin{cases}\dfrac{x^2+y^2}{|x|+y^2}, & x^2+y^2\neq 0\\ 0 & x^2+y^2=0\end{cases}$ $I=\lim_{x\to 0}\lim_{y\to 0}f(x,y)$ $J=\lim_{y\to 0}\lim_{x\to 0}f(x,y)$ ( )

A. I J B. J I C. I J $I\neq J$ D. I J $I=J$

(7) $\sum_{n=0}^{\infty}a_n$

$$\sum_{n=0}^{\infty}(-1)^n a_n,\quad \sum_{n=0}^{\infty}(a_n)^2,\quad \sum_{n=0}^{\infty}\sin(a_n),\quad \sum_{n=0}^{\infty}\ln(1+a_n)$$

( )

A. 1 B. 2 C. 3 D. 4

(8) $f(t)$ $u=f(xy)$ $\phi(t)=\dfrac{\partial^2 u}{\partial x\partial y}$ ( )

A. $tf''(t)-f'(t)$ B. $f''(t)-tf'(t)$ C. $tf''(t)+f'(t)$ D. $f''(t)+tf'(t)$

(9) $y' + P(x)y = Q(x)$ $y_1(x), y_2(x)$ C ( )

A. $C\left[y_1(x) - y_2(x)\right]$ B. $y_1(x) + C\left[y_1(x) - y_2(x)\right]$

C. $C\left[y_1(x) + y_2(x)\right]$ D. $y_1(x) + C\left[y_1(x) + y_2(x)\right]$

(10) $I = \iint_D \left(x^2 - y^2\right) dxdy$ D $\{(x,y) \in R^2 | \dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} < 1\}$ ( )

A. $a > b$ $I > 0$ B. $a > b$ $I < 0$ C. $a > b$ $I = 0$ D. $a < b$ $I = 0$

(10) $yy'' + (y')^2 = 0$ $y(0) = 1, y'(0) = \frac{1}{2}$

(10) L $\frac{x-1}{2} = \frac{y+1}{-1} = \frac{z}{1}$ z

(10) $a_0 = 3, a_1 = 5$ $n > 1$ $na_n = \frac{2}{3}a_{n-1} - (n-1)\,a_{n-1}$ $|x| < 1$ $\sum\limits_{n=0}^{\infty} a_n x^n$ $S(x)$

(10) $y = y(x)$ $e^y + 6xy + x^2 - 1 = 0$ $y''(0)$

(10) $R > 0$

$$I_R = \iiint\limits_{1/R \le x^2+y^2+z^2 \le R} \frac{e^{-(x^2+y^2+z^2)}}{x^2+y^2+z^2} dxdydz$$

$I = \lim\limits_{R \to +\infty} I_R$

(10)

$$I = \oint\limits_L \frac{(x^2 - y^2 - x)\, dy + (1 - 2x)ydx}{(x^2+y^2)\left[(x-1)^2 + y^2\right]}$$

$L = \left\{(x, y) \in R^2 \middle| x^2 + y^2 = 4\right\}$

(10) $f(x) = \sin\frac{1}{x}$ $x_n \to 0\ (n \to \infty)$ $\lim\limits_{n\to\infty} f(x_n)$ $\lim\limits_{x\to 0}\left[\lim\limits_{n\to\infty} f(x_n) + x\right]^{\left[2/f\left(\frac{1}{x}\right)\right]} = e^2$

(10) $f(x)$ $[a, b]$ 2 $a < b$ $f'\left(\frac{a+b}{2}\right) = 0$ $\xi \in (a, b)$ $|f''(\xi)| \ge \frac{4}{(b-a)^2}|f(b) - f(a)|$

(10)

(1) $[0, 1]$

(2) $[0, 1]$

(10) $f(x, y, z) = \ln x + 2\ln y + 3\ln z$ $x^2 + y^2 + z^2 = 6r^2$ a, b, c $ab^2c^3 \le 108\left(\frac{a+b+c}{6}\right)^6$

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(1) $h(x)$:

$$h(x)=\begin{cases}1 & x\geqslant 1\\ x & -1<x<1\\ -1 & x\leqslant -1\end{cases}$$

$g(x)=h\left(\sin x^2\right)$ ( )

A. B. C. D.

(2) $f(x)=\left(x+\frac{1}{x}\right)^{1000}$, $f'(x)=(\quad)$

A. $1000\left(x+\frac{1}{x}\right)^{1000}\left(1-\frac{1}{x}\right)$ B. $1000\left(x+\frac{1}{x}\right)^{999}\left(1-\frac{1}{x^2}\right)$

C. $\left(x+\frac{1}{x}\right)^{999}\left(1-\frac{1}{x^2}\right)$ D. $1000\left(x+\frac{1}{x}\right)^{1000}\left(1-\frac{1}{x^2}\right)$

(3) $\lim\limits_{x\to 0}\left(\frac{\cos x+\sin x}{\cos x-\sin x}\right)^{\frac{1}{x}}=(\quad)$

A. π^2 B. π C. e^2 D. e

(4) $L_1:\begin{cases}x+2y=1\\ y+\frac{1}{2}z=2\end{cases}$ $L_2:\frac{x-2}{-1}=\frac{y+1}{-2}=\frac{z-3}{2}$ α $\cos\alpha=(\quad)$

A. $\frac{1}{9}$ B. $\frac{2}{9}$ C. $\frac{1}{3}$ D. $\frac{4}{9}$

(5) $\lim\limits_{n\to\infty}\frac{\sqrt[n]{n!}}{n}=(\quad)$

A. e^{-1} B. e^{-2} C. e D. e^2

(6) $\int_0^{+\infty}\int_0^{+\infty}x^2e^{-2\left(x^2+y^2\right)^2}dxdy=(\quad)$

A. $\frac{\pi}{64}$ B. $\frac{\pi}{32}$ C. $\frac{\pi}{16}$ D. $\frac{\pi}{8}$

(7) $\lim\limits_{(x,y)\to(0,0)}\frac{|xy|}{\sqrt[4]{x^6+y^{18}}}=(\quad)$

A. 0 B. 1 C. ∞ D.

(8) $y'+y=xy^2,y(0)=\alpha$ $y^*(x)$ $\lim\limits_{x\to 1}y^*(x)=\frac{1}{e+2}$, $\alpha=(\quad)$

A. $\frac{1}{2}$ B. $\frac{1}{3}$ C. $\frac{1}{4}$ D. $\frac{1}{5}$

(9) $\sum\limits_{n=0}^{+\infty}\frac{2^n(n+1)}{n!}=(\quad)$

A. e^2 B. $2e^2$ C. $3e^2$ D. $4e^2$

(10) $f'\left(x^2\right)=\frac{1}{x}(x>0)$, $f(x)=(\quad)$

A. $2\sqrt{x}+C$ B. $\sqrt{x}+C$ C. $4\sqrt{x}+C$ D. $\frac{2}{\sqrt{x}}+C$

(10) $y_n = y_n(x)$ $x > 1$, $n \geqslant 1$, :

$$y_1(x) = 2x, y_{n+1}(x) = 2x - \frac{1}{y_n(x)}$$

: $\lim_{n\to\infty} y_n$,

(10) $x + y + z = \pm 1, 2x - y + 2z = \pm 2, x - y - z = \pm 3,$ Ω V

(10) $f(x) = x\cos x$ $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

(10) $y^2 = x, y^2 = 3x$ $y = x, y = 2x$ D

(10) : $e^x - 1 = xe^{x\theta(x)}, \theta(x) \in (0,1)$: $\lim_{x\to 0} \theta(x) = \frac{1}{2}$

(10) $y'' - y' - 2y = e^{2t}(3-t)$

(10) $I = \oint_L \frac{xdy - ydx}{x^2+2y^2}$, L $(1,1),(-1,0),(0,-1)$

(10) $\iint_S zdS$, S $\sqrt{x^2+y^2} \leqslant z \leqslant 1$

(10) $f(x)$ $g(x)$ $[a,b]$, :

$$\left(\int_a^b f(x)g(x)dx\right)^2 \leq \int_a^b f^2(x)dx \int_a^b g^2(x)dx$$

(10) $f(x)$ $[0,2]$, $f(0)=f(2)=0$:

$$\int_0^2 |f(x)f'(x)|\, dx \leq \frac{1}{2}\int_0^2 |f'(x)|^2\, dx$$

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(1) $f(x)=|x|\sin x^2$, ( )

A. $(-\infty,+\infty)$ B. $x\to\infty$, $f(x)$

C. $(-\infty,+\infty)$ D. $x\to\infty$, $f(x)$

(2) $\lim\limits_{n\to\infty}\left(\frac{1}{n^4+n^3+n^2+1}+\frac{2}{n^4+n^3+n^2+2}+\cdots+\frac{n^2}{n^4+n^3+n^2+n^2}\right)=(\quad)$

A. 0 B. $\frac{1}{2}$ C. 1 D. ∞

(3) $f(x)=(x-1)(x-2)^2(x-3)^3$, $f'(1)+f''(2)+f'''(3)=(\quad)$

A. 0 B. -2 C. -8 D. -10

(4) $f(x)=x\sin x+\cos x-\frac{\pi}{2}$, ( )

A. $f(0)$, $f\left(\frac{\pi}{2}\right)$ B. $f(0)$, $f\left(\frac{\pi}{2}\right)$

C. $f(0)$, $f\left(\frac{\pi}{2}\right)$ D. $f(0)$, $f\left(\frac{\pi}{2}\right)$

(5) $\lim\limits_{x\to 0}(1-3x)^{\frac{\cos x^2}{\sin x}}=(\quad)$

A. e^{-1} B. e^{-2} C. e^{-3} D. 1

(6) $\int_0^\pi (x\sin x)^2dx=(\quad)$

A. $\frac{\pi^2}{3}-\frac{\pi}{4}$ B. $\frac{\pi^3}{6}-\frac{\pi}{4}$ C. $\frac{\pi^3}{6}-\frac{\pi^2}{4}$ D. $\frac{\pi^3}{6}+\frac{\pi}{4}$

(7) D_K $D=\{(x,y)\mid x^2+y^2\leqslant 1\}$ k , $k=1,2,3,4$ $I_k=\iint_{D_k}(y-x)dxdy$, ( )

A. $I_1<0$ B. $I_2<0$ C. $I_3<0$ D. $I_4<0$

(8) $y_1(x)$ $y_2(x)$ $y'+p(x)y=0$ ( )

A. $y=Cy_1(x)$ B. $y=Cy_2(x)$

C. $y=C\left(y_1(x)+y_2(x)\right)$ D. $y=C\left(y_1(x)-y_2(x)\right)$

(9) $\sum\limits_{n=1}^{+\infty}u_n$ ( )

A. $\sum\limits_{n=1}^{+\infty}(-1)^n\frac{u_n}{n}$ B. $\sum\limits_{n=1}^{+\infty}u_n^2$

C. $\sum\limits_{n=1}^{+\infty}(u_{2n-1}-u_{2n})$ D. $\sum\limits_{n=1}^{+\infty}(u_n+u_{n+1})$

(10) $f'\left(\sin^2 x\right)=\cos 2x$, $f(0)=1$, $\int_0^1 f(x)dx=(\quad)$

A. 1 B. $\frac{1}{6}$ C. $\frac{7}{6}$ D. $\frac{1}{2}$

(10) $\lim\limits_{x\to 0}\frac{[\sin x-\sin(\sin x)]\sin x}{x^4\cos x^2}$

(10) : $\lim\limits_{n\to\infty}\int_0^{\pi}\sin^n t dt = 0$

(10) $f(x)=(x-1)^2$ $(0,1)$ $\sum\limits_{n=1}^{+\infty}\frac{1}{n^2}$

(10)

$$I=\iint_{\Sigma} 2x^3dydz+2y^3dzdx+3\left(z^2-2\right)dxdy$$

Σ $z=1-x^2-y^2(z\geqslant 0)$

(10) $\iint_{\Omega}\frac{(x+y)\ln\left(1+\frac{y}{x}\right)}{\sqrt{1-x-y}}dxdy,$ Ω $x+y=1,x=0,y=0$

(10) $y''\left(x+(y')^2\right)=y'$ $y(1)=y'(1)=1$

(10) $I=\oint_L \frac{xdy-ydx}{4x^2+y^2}$, L $(1,0)$, 2 ,

(10) $x\geqslant 0, a>0$, $\sqrt{x+a}-\sqrt{x}=\frac{a}{2\sqrt{x+\phi_a(x)}}$: $\frac{a}{4}\leqslant\phi_a(x)\leqslant\frac{a}{2}$ $\lim\limits_{x\to 0}\phi_a(x)=\frac{a}{4}$ $\lim\limits_{x\to\infty}\phi_a(x)=\frac{a}{2}$

(10) $f(x)$ $[0,2]$, :

$$\int_0^2 f(x)dx\leq\int_0^2 xf(x)dx$$

(10) $f(x)$ $[a,b]$ $f'(x)$, $f(a)=0$, $a<b$:

$$\int_a^b [f(x)]^2\,dx\leq\frac{(b-a)^2}{2}\int_a^b [f'(x)]^2\,dx$$

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(1) $f(x)$, x , $f(x)=\sin\pi x$ x , $f(x)=0$, ( )

A. $f(x)$ $(-\infty,+\infty)$ B. $f(x)$

C. $f(x)$ $(-\infty,+\infty)$ D. $f(x)$

(2) $f'\left(\sin^2 x\right)=\cos^2 x$, $f(x)$ ( )

A. $x-\frac{1}{2}x^2$ B. $x+\frac{1}{2}x^2$ C. $x-\frac{1}{2}x^2-C$ D. $\frac{1}{2}x^2-x+C$

(3) y_1 y_2 $y''+2y'+y=2xe^{-x}$ ( )

A. $\frac{1}{2}y_1+\frac{1}{2}y_2$ $\left(c_1x^3+c_2x^2\right)e^{-x}$, c_1,c_2

B. $\frac{1}{2}y_1-\frac{1}{2}y_2$ $\left(c_3x+c_4\right)e^{-x}$, c_3,c_4

C. $2y_1+y_2$ $\left(c_5x^3+c_6x^2\right)e^{-x}$, c_5,c_6

D. $2y_1-y_2$ $\left(c_7x+c_4\right)e^{-x}$, c_7,c_8

(4) $\int_0^\pi \frac{x\sin x}{1+\cos^2 x}dx=$ ( )

A. $\frac{\pi}{2}$ B. $\frac{\pi}{4}$ C. $\frac{\pi^2}{4}$ D. $\frac{\pi^2}{6}$

(5) a,b $(a+b)\perp(a-b), |a+b|=1, |a|=1$, $|a\times b|=$ ( )

A. $\frac{\sqrt{3}}{2}$ B. 1 C. $\frac{\sqrt{2}}{2}$ D. $\frac{1}{6}$

(6) $f(x)$, $F(t)=\int_1^t dy\int_y^t f(x)dx$, $F'(2)=$ ( )

A. $2f(0)$ B. $f(2)$ C. $-f(2)$ D. 0

(7) $\sum\limits_{n=1}^{+\infty} a_n$ $\sum\limits_{n=1}^{+\infty} a_n^2$ ( )

A. B. C. D.

(8) $\lim\limits_{x\to0,y\to0}\frac{x^2y}{\sqrt[3]{x^8+y^{12}}}=$ ( )

A. 0 B. $\frac{1}{\sqrt[3]{3}}$ C. $\frac{1}{\sqrt[3]{2}}$ D.

(9) $\lim\limits_{x\to0}\left(\frac{\sin}{x}\right)^{\frac{1}{x^2}}=$ ( )

A. $e^{\frac{1}{6}}$ B. $e^{-\frac{1}{6}}$ C. $e^{\frac{1}{2}}$ D. $e^{-\frac{1}{2}}$

(10) $\begin{cases} x-y+z-1=0 \\ 2x+y=0 \end{cases}$ $x+ky-z-5=0$ k ( )

A. -1 B. 0 C. 2 D. 1

(10) $\lim\limits_{n\to\infty}x_n=a, \lim\limits_{n\to\infty}y_n=b$,

$$\lim_{n\to\infty}\frac{x_1y_n+x_2y_{n-1}+\cdots+x_ny_1}{n}$$

(10) $y = y(x)$

$$\begin{cases} y'' = y'(2y+2) \\ y(0) = -1 \\ y'(0) = 1 \end{cases}$$

(10) $(x-1)^2 + y^2 + z^2 = 1$ $x = \sqrt{y^2+z^2}$ x , (x,y,z) $\rho(x,y,z) = 1 - (y^2+z^2)$,

(10) $f(x) = (\pi - |x|)^2 (-\pi \leqslant x \leqslant \pi)$ $\sum\limits_{n=1}^{+\infty} \frac{1}{n^2}$

(10) $f(x) = \int_0^x g(t)dt$, $\int_0^1 e^{-x^2} f(x)dx$, $g(t) = 5t^4 + 3t^2 + 1$

(10) $D=\{(x,y)\mid y>0\}$, $f(x,y)$, $t>0$ $f(tx,ty)=t^{-2}f(x,y)$ D L,

$$\oint_L yf(x,y)dx-xf(x,y)dy=0$$

(10)

$$I=\iint_\Sigma xzdydz+2yzdzdx+3xydxdy$$

, Σ $z=1-x^2-\frac{1}{4}y^2$ $(0\leqslant z\leqslant 1)$

(10) $f(x)$ $(0,\infty)$, $\lim\limits_{x\to\infty}f'(x)=0$, :

$$\lim_{x\to\infty}\frac{f(x)}{x}=0$$

(10) $f(x)$ $(-\infty,+\infty)$, $F(x)=\frac{1}{2\delta}\int_{-\delta}^{\delta}f(x+t)dt$, $\delta>0$: $F'(x)$, $x\in(-\infty,+\infty)$

(10) $f(x)$ $[a,b]$, $f'(a)=f'(b)=0$ $\xi\in(a,b)$,

$$|f''(\xi)|\geq\frac{4}{(b-a)^2}|f(b)-f(a)|$$

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(1) $f(x)=\frac{\sin x^2}{x}$, ( )

A. $(0,\infty)$

B. $(0,\infty)$ $f(x)$

C. $(0,\infty)$

D. $x\to\infty, x\to 0^+$, $f(x)$

(2) $\lim\limits_{x\to 0}\left(\frac{\sin x}{x}\right)^{\frac{1}{x^2}}=$ ( )

A. 1 B. 0 C. ∞ D. $e^{-\frac{1}{6}}$

(3) $y'=\frac{1}{y-x}$ ( )

A. $x=y+Ce^{-y}-1$

B. $y=x+Ce^{-x}-1$

C. $x=\ln(x-y-1)+C$

D. $y=\ln|y-x-1|+C$

(4) m,n , $m>n$: $S=\int_0^{\frac{\pi}{4}}\sin^m x\cos^n x dx, T=\int_0^{\frac{\pi}{4}}\sin^n x\cos^m x dx$ ( )

A. $S>T$ B. $S=T$ C. $S<T$ D. S,T

(5) $x\in\mathbb{R}$, $m\leqslant f(x)<g(x)<h(x)\leqslant M$ $g(x)$, $\lim\limits_{x\to\infty}[M-f(x)][h(x)-m]=0$ $\lim\limits_{x\to\infty}g(x)$ ( )

A. , $\frac{M+m}{2}$

B. , M m

C.

D. , $[m,M]$

(6) $f(x)=x^2\sin x+\cos x+\frac{\pi}{2}x$, ( )

A. 2 B. 3 C. 4 D. 4

(7) $\vec{a},\vec{b}$, $2\vec{a}+\vec{b}$ $\vec{a}-\vec{b}$ $\vec{a}+2\vec{b}$ $\vec{a}+\vec{b}$ ( )

A. $|\vec{b}|^2=7|\vec{a}|^2$ B. $|\vec{a}|^2=7|\vec{b}|^2$ C. $|\vec{b}|^2=5|\vec{a}|^2$ D. $|\vec{a}|^2=5|\vec{b}|^2$

(8) D $x+y=\frac{1}{2}, x+y=1$ $I_1=\iint_D \ln(x+y)^3 dxdy, I_2=\iint_D (x+y)^3 dxdy, I_3=\iint_D \sin(x+y)^3 dxdy$ ( )

A. $I_1<I_2<I_3$ B. $I_3<I_1<I_2$ C. $I_1<I_3<I_2$ D. $I_3<I_2<I_1$

(9) $\sum\limits_{n=1}^{\infty}a_n x^n$ $\sum\limits_{n=1}^{\infty}b_n x^n$ $\frac{\sqrt{2}}{3}$ $\frac{1}{3}$, $\sum\limits_{n=1}^{\infty}\frac{a_n^2}{b_n^2}x^n$ ( )

A. 2 B. $\frac{\sqrt{2}}{3}$ C. $\frac{1}{3}$ D. $\frac{1}{2}$

(10) $x^2+y^2+2z^2=5$, (x_0,y_0,z_0) $x+2y+z=0$, ( )

A. $x_0:y_0:z_0=4:2:1$

B. $x_0:y_0:z_0=2:4:1$

C. $x_0:y_0:z_0=1:4:2$

D. $x_0:y_0:z_0=1:2:4$

(10) $\lim\limits_{n\to\infty}\frac{1}{n}\left(\sqrt{1+\sin\frac{\pi}{n}}+\sqrt{1+\sin\frac{2\pi}{n}}+\cdots\cdots+\sqrt{1+\sin\frac{n\pi}{n}}\right)$

(10) $u = e^{x^2} \sin \frac{x}{y}$, $\frac{\partial^2 u}{\partial x \partial y}$ $(\pi, 2)$

(10) D $\begin{cases} y = x \\ y = 2x \\ xy = 1 \\ xy = 2 \end{cases}$, f , $f' = g$ L D :

$$\oint_L x f\left(\frac{y}{x}\right) \mathrm{d}x = -\int_1^2 \frac{g(u)}{2u} \, \mathrm{d}u$$

(10) $y_1 = x, y_2 = x^2, y_3 = e^x$: $y'' + p(x)y' + q(x)y = f(x)$
$y(0) = 1, y'(0) = 0$

(10) $f(x) = 4x + \cos \pi x + \frac{1}{1+x^2} - x^2 e^x + x e^x \int_x^1 f(t) dt$ $\int_0^1 (1-x) e^x f(x) dx$

(10) $I = \iint_\Sigma \frac{xdydz + ydzdx + zdxdy}{(x^2+y^2+z^2)^{\frac{3}{2}}}$, Σ $2x^2 + 2y^2 + z^2 = 4$

(10) $f(x) = x - 1$ $(0 \leqslant x \leqslant 2)$ 4

(10) $g(x)$, $x \geqslant a$, $|f'(x)| \leqslant g'(x)$ $x \geqslant a$, $|f(x) - f(a)| \leqslant g(x) - g(a)$

(10) $f(x)$ $[0, 2]$, $f'(0) = f'(2) = 0$ $(0, 2)$ ξ, $|f''(\xi)| \geqslant |f(2) - f(0)|$

(10) $0 < a < 1$ $x \geqslant 0$ $y \geqslant 0$:

(1) $x^a y^{1-a} \leqslant ax + (1-a)y$

(2) $x_1, x_2, x_3, \cdots, x_n, y_1, y_2, \cdots, y_n$, (1) :

$$x_1y_1 + x_2y_2 + \cdots + x_ny_n \leqslant \left(x_1^2 + x_2^2 + \ldots + x_n^2\right)^{\frac{1}{2}} \left(y_1^2 + y_2^2 + \ldots + y_n^2\right)^{\frac{1}{2}}$$

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(1) $\{a_n\}$ $a \geqslant 2$, $\lim\limits_{n\to\infty}\frac{1}{n}\sum\limits_{k=1}^{n} a_k =$ ( )

A. ∞ B. 0 C. 1 D. a

(2) $\lim\limits_{x\to 0}\left(\frac{1}{x\sin x}-\frac{1}{x^2}\right) =$ ( )

A. 0 B. ∞ C. $\frac{1}{6}$ D. $\frac{1}{3}$

(3) $M=\int_0^{\frac{\pi}{2}}\frac{\sin^2 x}{1+x^k}dx, N=\int_0^{\frac{\pi}{2}}\frac{\cos^2 x}{1+x^k}dx, k$ ( )

A. $M<N$ B. $M=n$ C. $M>N$ D. M,N

(4) a_n , $\lim\limits_{n\to\infty}a_n=0$, $S_n=\sum\limits_{k=1}^{n}a_k$ $\{S_n\}$, $\sum\limits_{n=1}^{\infty}a_n(x-1)^n$ ( )

A. $[-1,1]$ B. $[-1,1)$ C. $[0,2)$ D. $(0,2]$

(5) $u(x,y)=\varphi(x)-\varphi(x-y)+\int_{x-y}^{x}\phi(t)dt$, φ , ϕ , ( )

A. $\frac{\partial^2 u}{\partial x\partial y}=\frac{\partial^2 u}{\partial x^2}$ B. $\frac{\partial^2 u}{\partial x\partial y}=-\frac{\partial^2 u}{\partial x^2}$ C. $\frac{\partial^2 u}{\partial x\partial y}=\frac{\partial^2 u}{\partial y^2}$ D. $\frac{\partial^2 u}{\partial x\partial y}=-\frac{\partial^2 u}{\partial y^2}$

(6) $y=f(x)$ $y''-2y'+4y=0$, $f(x_0)>0, f'(x_0)=0$, $f(x)$ x_0 ( )

A. B. C. D.

(7) Σ zoy $z=y^2(0\leqslant y\leqslant 2)$ z $z=4$, $\cos\alpha,\cos\beta,\cos\gamma$, $\iint\limits_{\Sigma}\left[\left(\frac{x^2y}{2}+2x-z\right)\cos\alpha+(3y+z)\cos\beta-xyz\cos\gamma\right]dS$ ( )

A. 40 B. 40π C. 20 D. 20π

(8) $xe^{-2x}, e^x, 3x$ n $y^{(n)}+a_1y^{(n-1)}+\ldots\ldots+a_{n-1}y'+a_ny=0$, e^{-x} , ( )

A. $n=6, a_1=4, a_2=3, a_3=a_4=-4, a_5=a_6=0$

B. $n=5, a_1=3, a_2=0, a_3=-4, a_5=a_4=0$

C. $n=4, a_1=1, a_2=-3, a_3=a_4=0$

D. $n=3, a_1=-1, a_3=a_2=0$

(9) $L_1:\begin{cases}2x+y-z+1=0\\ x-2y+2z-3=0\end{cases}$ $L_2:\begin{cases}y+z+5=0\\ 2x-z+1=0\end{cases}$ L_1 L_2 ( )

A. $\frac{\pi}{6}$ B. $\frac{\pi}{4}$ C. $\frac{\pi}{3}$ D. $\frac{\pi}{2}$

(10) $\int_0^{\pi}\sqrt{1-\sin x}dx =$ ( )

A. π B. $\frac{\pi}{2}$ C. $\sqrt{2}+1$ D. $4(\sqrt{2}-1)$

(10) $a\geqslant -12$, $x_1=a$, $x_{n+1}=\sqrt{12+x_n}$, $\{x_n\}$; , $\{x_n\}$

(10) L $x^2+y^2=2$, , $f(x)$ R :

$$\int_L y\left(f(x)-\frac{1}{f(x)}\right)dx+\left(x^2y+2xf(y)\right)dy \geq 1+\pi$$

(10)

$$\left[2x+e^x\sin(xy)+ye^x\cos(xy)\right]dx+\left[xe^x\cos(xy)+3y^2\right]dy=0$$

(10) $f(x)=1-x^2\ (0\leqslant x\leqslant\pi)$ $\sum\limits_{n=1}^{\infty}\frac{(-1)^{n+1}}{n^2}$

(10) $2\mu + e^{\mu} = xy$, $\frac{\partial^2 u}{\partial x \partial y}$

(10) $f(x)$ $(0, +\infty)$,

(1) $\lim\limits_{x \to +\infty} f'(x)$

(2) $\lim\limits_{x \to +\infty} f'(x)$, $\lim\limits_{x \to +\infty} f'(x) = 0$

(10) $f(x)$ $[0, 2]$:

$$\int_0^2 x f(x) dx \leqslant \int_0^2 f(x) dx$$

(10) $0 \leqslant a, b \leqslant 1$, $a + b = 1$, x, y $e^{ax+by} \leq ae^x + be^y$

(10) $f(x)$ $[0, \pi]$, $\int_0^{\pi} f(x) dx = 0, \int_0^{\pi} f(x) \cos x dx = 0$: $(0, \pi)$ ξ_1, ξ_2, $f(\xi_1) = f(\xi_2) = 0$

(10) $f(x)$ $[0, 1]$ $\int_0^{\infty} e^{-x^2} dx = \frac{\sqrt{\pi}}{2}$

$$\lim_{t \to +\infty} \int_0^1 t e^{-t^2 x^2} f(x) dx = \frac{\sqrt{\pi}}{2} f(0)$$

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(1) $f(x)$ $f'(x)$ $(-\infty,+\infty)$, $a>0$, $F(x)$

$$F(x)=\begin{cases} a & f(x)\geqslant a \\ f(x) & -a<f(x)<a \\ -a & f(x)\leqslant -a \end{cases}$$

( )

A. B. C. D.

(2) $\lim\limits_{n\to\infty}\left(\frac{1}{n^2+2n+1}+\frac{2}{n^2+2n+2}+\cdots+\frac{n}{n^2+2n+n}\right)=(\quad)$

A. 1 B. ∞ C. $\frac{1}{2}$ D. 0

(3) $f(x)=(x+2\cos x)^2$ $[0,\pi/2]$ ( )

A. $\frac{\pi^2}{36}+\frac{\sqrt{3}\pi}{3}+1$ B. $\frac{\pi^2}{36}+\frac{\sqrt{3}\pi}{3}+2$ C. $\frac{\pi^2}{36}+\frac{\sqrt{3}\pi}{3}+3$ D. $\frac{\pi^2}{4}$

(4) $f(x)=x(x+1)\cdots(x+20)$, ( )

A. $f'(-1)>0, f'(-2)>0$ B. $f'(-1)>0, f'(-2)<0$
C. $f'(-1)<0, f'(-2)<0$ D. $f'(-1)<0, f'(-2)>0$

(5) $g(x)\cdot\int_0^2 f(x)dx=10$, $\int_0^2 f(x)dx\cdot\int_0^2 g(x)dx=(\quad)$

A. 20 B. 10 C. 5 D.

(6) $\lim\limits_{\substack{x\to 0\\ y\to 0}}\frac{xy}{\sqrt[3]{x^4+y^{12}}}=(\quad)$

A. 0 B. $\frac{1}{\sqrt{2}}$ C. $\frac{1}{\sqrt[3]{2}}$ D.

(7) $f(u)$ $f'(u)>0, f(0)=0, L$ $x^2+y^2=1$ $y=x$ y , $c_1=\int_L f(2xy)ds$ $c_2=\int_L f\left(2x^2-1\right)ds$ ( )

A. $c_1>0, c_2>0$ B. $c_1>0, c_2<0$ C. $c_1<0, c_2>0$ D. $c_1<0, c_2<0$

(8) $y''+ay'+by=0$ $y(x)$ $x\to+\infty, y\to 0$, a,b ( )

A. $a>0, b>0$ B. $a>0, b<0$ C. $a<0, b>0$ D. $a<0, b<0$

(9) $\sum\limits_{n=1}^{\infty}\frac{(x+1)^n}{\sqrt{n}}$ ( )

A. $[-2,0)$ B. $(-2,0)$ C. $(-2,0]$ D. $[-2,0]$

(10) $(0,0,1)$ $\begin{cases} x=t+1 \\ y=-t-4 \\ z=2t \end{cases}$ $\frac{x-1}{-1}=\frac{y}{2}=\frac{z}{-1}$ ( )

A. $5x+2y-z+1=0$ B. $5x-y-3z+3=0$

C. $3x+y-z+1=0$ D. $-3x-y+z+1=0$

(10) $\lim_{x\to 0^+} x^{(x^x-1)}$

(10) $y''=y'(y-3)$ $y(0)=1, y'(0)=-\frac{5}{2}$

(10) $f(x)=\pi^2-x^2$ $[-\pi,\pi)$

(10) $\iint_S xydydz+z^2dxdy,$ S $z=\sqrt{x^2+y^2}\ (0\leqslant z\leqslant 1)$ (z) $z=1$

(10) $f(x)$ $f(1)=1$ $x\geqslant 1,$

$$f'(x)=\frac{1}{x^2+f^2(x)}$$

$\lim_{x\to+\infty} f(x)$ $1+\frac{\pi}{4}$

(10) f, g : $x \in [0,1]$, $f(x)+g(x) \neq 0$ a $(0 \leqslant a \leqslant 1)$

$$\int_a^1 |f(x)|dx = \int_0^a g^2(x)dx$$

(10)

$$\lim_{x\to+\infty} \frac{1}{x}\int_x^{2x} |\cos t|dt = \frac{2}{\pi}$$

(10) $f(x) = \frac{1}{1+x^2} - xe^x \int_0^1 f(x)dx,$ $f(x)$ $f'(x)$

(10) $f(x)$ $[a,b]$, (a,b) $\xi, \eta \in (a,b),$

$$f'(\eta) = \left(b^2+ab+a^2+2\right)\frac{f'(\zeta)}{3\zeta^2+2}$$

(10) $f(x)$ $[0,2]$, $x \in [0,2],$ $|f(x)| \leqslant 1, |f''(x)| \leqslant 1$: $x \in [0,2], |f'(x)| \leqslant 2$

2012

:

1. 150 , 180

2. ,

(50 5)

(1) $f(x)=x\cos x^2$, ( )

A. $(-\infty,0)$ B. $x\to\infty$, $f(x)$

C. $(-\infty,0)$ D. $x\to\infty$, $f(x)$

(2) $f(x)$, $0<m<f(x)<M<\infty$, $\frac{1}{m}\int_{-m}^{m}(f(t)-M)dt$ ( )

A. $(-M-m,m-M)$ B. $(2m-2M,0)$

C. $(m-M,0)$ D. $(0,M+m)$

(3) $yy''-(y')^2=0$ ( )

A. $y=xe^x$ B. $y=x\ln x$ C. $y=\ln x$ D. $y=e^x$

(4) n,m , $n<m$, $A=\int_0^1 x^m(1-x)^n dx, B=\int_0^1 x^n(1-x)^{m+1}dx$, ( )

A. $A>B$ B. $A=B$ C. $A<B$ D. A,B

(5) $f(x)=e^x-x^2-4x-3$ ( )

A. 1 B. 2 C. 3 D. 3

(6) $f(x)=\begin{cases} e^x(\sin x+\cos x) & x\geqslant 0 \\ abx^2+ax+2a+b & x<0 \end{cases}$ $(-\infty,+\infty)$, ( )

A. $a=2,b=-1$ B. $a=2,b=-3$ C. $a=1,b=-3$ D. $a=1,b=-1$

(7) $\sum\limits_{n=1}^{\infty}a_n(x-1)^n$ $x=4$, $\sum\limits_{n=1}^{\infty}(-1)^n\left(1+2^n\right)a_n$ ( )

A. B. C. D.

(8) S $\begin{cases} x=u\cos v \\ y=u\sin v \\ z=v \end{cases}$ $0\le u\le\sqrt{15}$ $0\le v\le\pi$ $\iint_S\sqrt{x^2+y^2}dS$ ( )

A. 17π B. 19π C. 21π D. 23π

(9) $\lim\limits_{x\to 0}\left(\frac{x}{\sin x}\right)^{\frac{1}{1-\cos x}}$ ( )

A. $e^{\frac{1}{3}}$ B. $e^{\frac{-1}{3}}$ C. $e^{\frac{1}{2}}$ D. $e^{-\frac{1}{2}}$

(10) $M(1,1,-1)$ $L:\frac{x}{2}=\frac{y+1}{1}=\frac{z-3}{-1}$, $x-2y-z+1=0$ ( )

A. $(-5,1,3)$ B. $(1,-3,5)$ C. $(1,-5,3)$ D. $(3,-1,5)$

(10) $\lim\limits_{n\to\infty}\left(\frac{1}{n}+\frac{1}{n+1}+\cdots+\frac{1}{3n}\right)$,

(10) $y'' - 3y' + 2y = e^x(2x+1)$

(10) $\iint_D (x|y| + xy)dxdy,$ D $5y = x^2 - 6$ $y^2 = x$

(10) $f(x) = |x-1| (0 \leqslant x \leqslant \pi)$

(10) $f(x) = \int_x^1 e^{-t^2} dt,$ $\int_0^1 x^2 f(x) dx$

(10) $I=\oint_L \frac{xdy-ydx}{x^2+2y^2}$, L $x+y=1, y=x-1$ $x^2+y^2=1, x \leqslant 0$,

(10) $f(x)$, $f^2(x) \leqslant |x|^3$, $F(x)=\int_0^1 f(xt)dt$, $F'(x)$, $F'(x)$

(10) $f(x)$ $[a,b]$, (a,b) , $0<a<b$: $\xi \in (a,b)$, $\frac{a+b}{2\xi} f'(\xi)=\frac{f(b)-f(a)}{b-a}$

(10) $f(x)$ $(-\infty,+\infty)$ $f''(x)>0$:

$$f\left(\frac{x_1+x_2+\cdots+x_n}{n}\right) \leq \frac{f\left(x_1\right)+f\left(x_2\right)+\cdots+f\left(x_n\right)}{n}$$

(10) $a<b$, $f(x)$ $[a,b]$,

$$\int_a^b f(x)dx=\int_a^b xf(x)dx=\int_a^b x^2 f(x)dx=0$$

(a,b) x_1, x_2, x_3, $f\left(x_1\right)=f\left(x_2\right)=f\left(x_3\right)=0$

2011

:

1. 150 , 180

2. ,

(40 5)

(1) $\lim\limits_{x\to+\infty} x\left[\left(1+\frac{1}{x}\right)^x - e\right] = (\quad)$

A. 0 B. ∞ C. $\frac{e}{2}$ D. $-\frac{e}{2}$

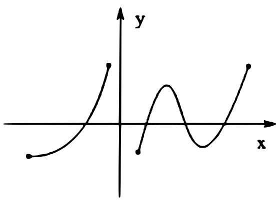
(2) $\begin{cases} x^2+2x & (x\geqslant 0) \\ \ln(1+ax) & (x<0) \end{cases}$ $x=0$, a ( )

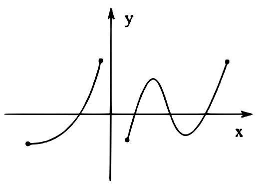
A. -2 B. 2 C. -1 D. 1

(3) $\lim\limits_{x\to a}\frac{f(x)-f(a)}{(x-a)^4} = -2,$ $f(x)$ $x=a$ ( )

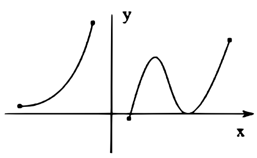
A. 0 B. 0 $x=a$ C. D.

(4) $f(x)$, $f(x)$, $f'(x)$ ( )

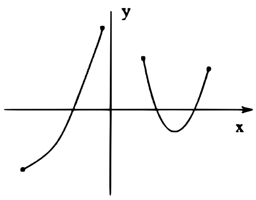




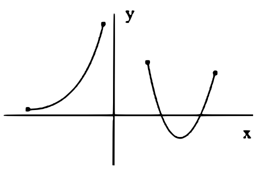
A.



B.



C.



D.

(5) $x^2\ln x$ $f(x)$, $\int xf'(x)dx = (\quad)$

A. $\frac{2}{3}x^3\ln x + \frac{1}{9}x^3 + C$ B. $2x - x^2\ln x + C$

C. $x^2\ln x + x^2 + C$ D. $3x^2\ln x + x^2 + C$

(6) y_1, y_2 $y'' + p(x)y' + q(x)y = 0$, C_1, C_2 , ( )

A. $C_1y_1 + C_2y_2$ B. $C_1y_1 + C_2y_2$,

C. $C_1y_1 + C_2y_2$ D. $C_1y_1 + C_2y_2$

(7) $\sum_{n=1}^{\infty} u_n$ $\sum_{n=1}^{\infty} v_n$ ( )

A. $\sum_{n=1}^{\infty}(u_n + v_n)$ B. $\sum_{n=1}^{\infty} u_n v_n$ C. $\sum_{n=1}^{\infty}(|u_n| + |v_n|)$ D. $\sum_{n=1}^{\infty}(u_n^2 + v_n^2)$

(8) $y = nx^2 + \frac{1}{n}$ $y = (n+1)x^2 + \frac{1}{n+1}$ A_n, $\lim_{n\to\infty} A_n =$ ( )

A. 0 B. 1 C. 2 D. 3

(10) $f(x)$ $[0, 2\pi]$, $f'(x) \geqslant 0$, n,

$$\left|\int_0^{2\pi} f(x)\sin(nx)dx\right| \leqslant \frac{2}{n}\left[f(2\pi) - f(0)\right]$$

(10) $f(x)$, $f(x) = x + \int_0^x tf'(x-t)dt$, $\lim_{x\to-\infty} f(x)$

(10) $z = f(x, y)$ $\frac{\partial^2 z}{\partial x\partial y} = x + y, f(x, 0) = x, f(0, y) = y^2$, $f(x, y)$

(10) $f(x, y) = (x-6)^2 + (y+8)^2$ $D = \{(x, y) \mid x^2 + y^2 \leqslant 25\}$

(10) $\iint_D (|x|+|y|)dxdy$, D $x=0, x+y=3, y=x-1$ $y=x+1$

(10) $I=\oint_L \frac{xdy-ydx}{4x^2+y^2}$, L $(1,0)$, R $(R>0, R\neq 1)$,

(10) $f(x)$ $(-\infty,+\infty)$ $x=0$, $\lim\limits_{x\to 0}\frac{f(x)}{x}=a>0$, : $\sum\limits_{n=1}^{\infty}(-1)^n f\left(\frac{1}{n}\right)$ $\sum\limits_{n=1}^{\infty} f\left(\frac{1}{n}\right)$

(10) $f(x)=x^2(-\pi\leqslant x\leqslant\pi)$ 2π

(10) $f(x)$, $f(0)=0, f'(0)=\frac{1}{3}$, Σ $\oint_\Sigma e^x\left(f'(x)dydz-2yf(x)dzdx-zdxdy\right)=0$, $f(x)$

(10) $(1,2,3)$ x y

(10) $f(x)$ $[0,c]$, f' $f(0)=0$, : $0\leqslant a\leqslant b\leqslant a+b\leqslant c$ $f(a+b)\leqslant f(a)+f(b)$

2010

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1. 150 , 180
2. ,

(40 5)

(1) $\lim\limits_{x\to 0}\frac{a\tan x+b(1-\cos x)}{c\ln(1-2x)+d\left(1-e^{-x^2}\right)}=2,\quad a^2+c^2\neq 0,\quad (\quad)$

A. $b=4d$ B. $b=-4d$ C. $a=4c$ D. $a=-4c$

(2) $y=y(x)\quad \Delta y=\frac{1-x}{\sqrt{2x-x^2}}\Delta x+o(\Delta x), y(1)=1, \int_0^1 y(x)=(\quad)$

A. 2π B. π C. $\frac{\pi}{2}$ D. $\frac{\pi}{4}$

(3) $f(x)=\int_0^x t^2(t-1)dt,\quad f(x)\quad (\quad)$

A. 0 B. 1 C. 2 D. 3

(4) $(\quad)$

A. $\sum\limits_{n=1}^{\infty}a_n, \sum\limits_{n=1}^{\infty}b_n \quad \sum\limits_{n=1}^{\infty}a_nb_n$ B. $\sum\limits_{n=1}^{\infty}a_n \;, \sum\limits_{n=1}^{\infty}b_n \quad \sum\limits_{n=1}^{\infty}a_nb_n$

C. $\sum\limits_{n=1}^{\infty}a_n \;, \sum\limits_{n=1}^{\infty}b_n \quad \sum\limits_{n=1}^{\infty}a_nb_n$ D. $\sum\limits_{n=1}^{\infty}a_n \;, \sum\limits_{n=1}^{\infty}b_n \quad \sum\limits_{n=1}^{\infty}a_nb_n$

(5) $a_0,a_1,a_2,a_3\ldots$, $d>0,\quad \sum\limits_{n=0}^{\infty}a_nx^n\quad (\quad)$

A. $(-d,d)$ B. $[-d,d)$ C. $(-1,1)$ D. $[-1,1)$

(6) $y_1(x),y_2(x),y_3(x)\quad y''+p(x)y'+q(x)y=f(x)\quad C_1,C_2$, $(\quad)$

A. $C_1y_1(x)+C_2y_2(x)+C_3y_3(x)$

B. $C_1y_1(x)+C_2y_2(x)+(1-C_1-C_2)\,y_3(x)$

C. $C_1y_1(x)+C_2y_2(x)-(C_1+C_2)\,y_3(x)$

D. $C_1y_1(x)+C_2y_2(x)-(1-C_1-C_2)\,y_3(x)$

(7) $2x+y-4=0\quad y+2z=0\quad M_0(2,-1,-1)\quad (\quad)$

A. $3x+y-z=6$ B. $x+3y-z=0$ C. $3x-y+z=6$ D. $x-3y-z=6$

(8) $y=e^x\quad y\quad (\quad)$

A. $\frac{e}{2}-1$ B. $\frac{e}{2}+1$ C. $\frac{e}{2}$ D. $e+1$

(12) $g(x)\quad T$, $g(0)=1, f(x)=\int_0^{2x}|x-t|g(t)dt,\quad f'(T)$

(12) $(1,2,3)\quad x\quad y$

(12)

$$yy'' - (y')^2 = y^2 \ln y$$

: $\int \frac{dx}{\sqrt{x^2+a^2}} = \ln\left(x + \sqrt{x^2+a^2}\right)$+C

(12) $f(x) = \frac{x-1}{(x+1)^2}$ $x = 0$,

(12) $2x^2 + 2y^2 + z^2 = 1$, $f(x, y, z) = x^2 + y^2 + z^2$, $\vec{l} = \vec{i} - \vec{j}$

(14) $f(x)$ $[0,+\infty)$,

$$f(t)=\iiint\limits_{x^2+y^2+z^2\leqslant t^2} f\left(\sqrt{x^2+y^2+z^2}\right)dv+t^3$$

$f(x)$

(12) $u=u\left(\sqrt{x^2+y^2}\right)$,

$$\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}-\frac{1}{x}\frac{\partial u}{\partial x}+u=x^2+y^2$$

u

(12) $f(x)$ G

$$\int_M^N \frac{1}{2x^2+f(y)}(ydx-xdy)$$

G , M N G , $f(1)=1$

(1) $f(x)$;

(2) $\oint_\Gamma \frac{1}{2x^2+f(y)}(ydx-xdy)$ Γ $x^{\frac{2}{3}}+y^{\frac{2}{3}}=a^{\frac{2}{3}}$,

(10) $f(x)$ $[0,1]$, $f(0)=f(1)=0, f(x)$, :

$$\int_0^1 |f''(x)|\,dx \geqslant 4\max_{0\leqslant x\leqslant 1}|f(x)|$$

(10) a m aq m($0<q<1$) q

2009

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1. 150 , 180

2. ,

(30 6)

(1) $y=\sqrt[4]{x\sqrt[3]{e^x\sqrt{\sin\frac{1}{x}}}}$, $\frac{dy}{dx}=$ __________

(2) $z=\frac{1}{x}f(xy)+yg(x+y)$, f,g , $\frac{\partial^2 z}{\partial x^2}=$ __________

(3) $f(x)=\frac{1}{x^2-2x-3}$ x , : __________

(4) $P(-1,0,4)$ $3x-4y+z+10=0$ $L:\frac{x+1}{1}=\frac{y-3}{1}=\frac{z}{2}$: __________

(5) $yy''+(y')^2=0$ $y|_{x=0}=1, y'|_{x=0}=\frac{1}{2}$: __________

(30 6)

(1) $\lim\limits_{x\to 2}\frac{\int_2^x\left(\int_t^2 e^{-u^2}du\right)dt}{(x-2)^2}=(\quad)$

A. $\frac{1}{e^2}$ B. $-\frac{1}{e^2}$ C. $\frac{1}{2e^4}$ D. $-\frac{1}{2e^4}$

(2) $\int_0^1 e^{\sqrt{1-x}}dx=(\quad)$

A. 0 B. 1 C. 2 D. 3

(3) $[0,+\infty)$ $f''(x)>0$, $x\in(0,+\infty)$, $(\quad)$

A. $f'(0)x<f(0)-f(x)<f'(x)x$ B. $f'(0)x<f(x)-f(0)<f'(x)x$

C. $f(0)-f(x)>f'(0)x>f'(x)x$ D. $f(0)-f(x)<f'(0)x<f'(x)x$

(4) $L:x^2+(y+1)^2=2$, $\oint_L\frac{xdy-ydx}{x^2+(y+1)^2}=(\quad)$

A. 4π B. 2π C. π^2 D. $2\pi^2$

(5) Σ $z=x^2+y^2(0\leqslant z\leqslant 1)$, $I=\iint\limits_{\Sigma}y^3dzdx+(y+z)dxdy=(\quad)$

A. $-\frac{\pi}{2}$ B. $\frac{\pi}{2}$ C. $-\frac{\pi}{4}$ D. $\frac{\pi}{4}$

(10) $\lim\limits_{x\to\infty}\left(\frac{x-a}{x+a}\right)^x=\int_a^{+\infty}xe^{-2x}dx$, a

(10) $f(x)$ $[0,1]$, $f(x)>0$, $a\in(0,1)$, $\int_0^a f(t)dt=\int_a^1\frac{1}{f(t)}dt$

(10) $x=0, y=8$ $y=x^2$, $y=x^2$ $M(X,Y)$, $x=0,y=8$

(10) $x=\int_0^x f(t)dt+\int_0^x tf(t-x)dt$ $f(x)$

(10) $F\left(x+\frac{z}{y},y+\frac{z}{x}\right)=0$ $z=z(x,y)$ $x\frac{\partial z}{\partial x}+y\frac{\partial z}{\partial y}=z-xy$。

(10) $y_1 = xe^x + e^{2x}, y_2 = xe^x + e^{-x}, y_3 = xe^x + e^{2x} - e^{-x}$

(10) $f(x)$ 2 $f(x) = \begin{cases} x & 0 \leqslant x \leqslant 1 \\ 0 & 1 < x < 2 \end{cases}$, $f(x)$, $\sum_{n=0}^{\infty} \frac{1}{(2n+1)^2}$

(10) $f(x)$, $F(t) = \iint\limits_{x^2+y^2 \leqslant t^2} f\left(x^2 + y^2\right) dxdy \ (t \geqslant 0)$ $F''(0)$

(10) $f(x)$ $[0,1]$ $(0,1)$ $f(0) = 0$ $f(1) = 1$ a, b $(0,1)$ ξ η,

$$\frac{a}{f'(\xi)} + \frac{b}{f'(\eta)} = a + b$$

2008

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1. 150 , 180
2. ,

(30 6)

(1) $\lim\limits_{n\to\infty}\sum\limits_{k=1}^{n}\frac{k}{n^2+k}$ ____________

(2) $y=y(x)$ $y''+2y'+y=e^{3x}$ $y(0)=0$ $y=y(x)$ $\lim\limits_{x\to 0}\frac{\ln\left(1+x^2\right)}{y(x)}=$ ____________

(3) $f'(x)\cdot\int_0^2 f(x)dx=8,\quad f(0)=0,\quad \int_0^2 f(x)dx=$ ____________

(4) $\int_0^{\pi}\left[f(x)+f''(x)\right]\sin x dx=3, f(\pi)=2,\quad f(0)=$ ____________

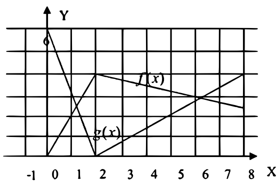
(5) $(0,1)$ $y=f(x)$ $\int_0^2\left[x^2-(f(x))^2\right]dx$ ____________

(30 6)

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

A. B. C. D.

(2) , $f(x), g(x)$, $u(x)=f(g(x))$, $u'(1)$ ( )



A. $\frac{3}{4}$ B. $-\frac{3}{4}$ C. $-\frac{1}{12}$ D. $\frac{1}{12}$

(3) $xe^{-x}=\frac{1}{2e}$ ( )

A. 0 B. 1 C. 2 D. 3

(4) $L_1\begin{cases}x=1\\ y=-2+t\\ z=1+t\end{cases}$ $L_2:\frac{x+1}{1}=\frac{y+1}{2}=\frac{z-1}{1}$ π ( )

A. $x+y+z=0$ B. $x-y+z=0$ C. $x+y-z=0$ D. $z-y-z=0$

(5) $x^2=\sum\limits_{n=0}^{\infty}a_n\cos nx\quad(-\pi\leqslant x\leqslant\pi)$, $a_2=$ ( )

A. $\frac{-2}{\pi}$ B. $\frac{2}{\pi}$ C. 1 D. -1

(10) $\int_{-1}^{2}\left(|x|+2x^2\right)dx$

(10) $y = x^2$ $y = t(0 < t < 1)$ $x = 0, x = 1$ $S(t)$, $S(t)$, ,

(10) $f(x)$ $[0,1]$, $f(1) = 2\int_0^{\frac{1}{2}} xf(x)dx$, : $\xi \in (0,1)$, $\xi f(\xi) + f(\xi) = 0$

(10) $u = f\left(\ln\sqrt{x^2+y^2}\right)$, $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = (x^2+y^2)^{\frac{3}{2}}$, f

(10) $I = \iint_D \sqrt{1-y^2}dxdy$, D $x^2+y^2=1(y>0)$ $y=|x|$

(10) $y' + y = y^2(\cos x - \sin x)$

(10) $\sum\limits_{n=1}^{\infty}(-1)^{n-1}n(n+1)x^n$ $(-1,1)$ $S(x)$, $\sum\limits_{n=1}^{\infty}(-1)^{n-1}\frac{n(n+1)}{3^n}$

(10) $f(x)$ $[0,+\infty)$, $f(0)=1$, $f'(x)+f(x)-\frac{1}{1+x}\int_0^x f(t)dt = 0$, $f'(x)$,
:

$$e^{-x} \leqslant f(x) \leqslant 1 \quad (x \geqslant 0)$$

(10) $f(x), g(x)$

$$\oint_C \left[y^2 f(x) + 2ye^x + 2yg(x)\right] dx + 2[yg(x)+f(x)]dy = 0$$

C $f(x)$ $g(x)$ $f(0)=g(0)=0$

2007

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1. 150 , 180
2. ,

(30 6)

(1) $\lim\limits_{x\to 0}\frac{\tan x-\sin x}{\ln(1+x^3)}$ ____________

(2) $f(x,y)$, $f(0,0)=0, f'_x(0,0)=m, f'_y(0,0)=n, \phi(t)=f(t,f(t,t))$, $\phi'(0)=$ ____________

(3) $\int\frac{dx}{1+\sqrt[3]{x+2}}=$ ____________

(4) $x^2y'+xy=y^2$ $y(1)=2$ ____________

(5) Σ $x^2+y^2+z^2=a^2$, $\cos\alpha,\cos\beta,\cos\gamma$ $\iint_\Sigma\frac{x\cos\alpha+y\cos\beta+z\cos\gamma}{(x^2+y^2+z^2)^{\frac{3}{2}}}dS=$ ____________

(30 6)

(1) $f(x)=\begin{cases}\frac{\sin(x-1)}{e^{x-1}-a}\left(\frac{1}{x}-b\right) & x\neq 1\\ 2 & x=1\end{cases}$ $f(x)$ $x=1$, ( )

A. $a=0,b=1$ B. $a=1,b=-1$ C. $a=-1,b=1$ D. $a=1,b=0$

(2) $f(x),g(x)$ x_0 , $f(x_0)=g(x_0)=0, f'(x_0)\cdot g'(x_0)>0$, ( )

A. x_0 $f(x)\cdot g(x)$
B. x_0 $f(x)\cdot g(x)$, $f(x)\cdot g(x)$
C. x_0 $f(x)\cdot g(x)$,
D. x_0 $f(x)\cdot g(x)$,

(3) $f(x)$ $f(x)=f(2a-x)(a\neq 0), c$, $\int_{-c}^{c}f(a-x)dx=$ ( )

A. $2\int_0^c f(2a-x)dx$
B. $2\int_{-c}^c f(2a-x)dx$
C. 0
D. $2\int_0^c f(a-x)dx$

(4) $P_1(-2,3,1)$ $L: x=y=z$ P_2 ( )

A. $\left(-\frac{2}{3},1,\frac{1}{3}\right)$ B. $\left(\frac{2}{3},-1,-\frac{1}{3}\right)$ C. $\left(-\frac{10}{3},\frac{5}{3},-\frac{1}{3}\right)$ D. $\left(\frac{10}{3},-\frac{5}{3},\frac{1}{3}\right)$

(5) $f(x)$ $[-\pi,\pi]$, $f(x+\pi)=-f(x)$, $f(x)$ $a_{2n}(n=1,2\cdots)$ ( )

A. 0 B. π C. $\frac{1}{\pi}$ D. $\frac{4}{\pi}$

(10) $f(x)$ $(-\infty,+\infty)$, $f(0)=0$,

$$\varphi(x)=\begin{cases}f'(0) & x=0\\ \dfrac{e^x}{x}f(x) & x\neq 0\end{cases}$$

$\varphi(x)'$

(10) $x=\int_0^x f(t)dt+\int_0^x tf(t-x)dt$ $f(x)$

(10) $u = f(zyx), f(0) = 0, f'(1) = 1,$ $\frac{\partial^3 u}{\partial x \partial y \partial z} = x^2 y^2 z^2 f'''(xyz),$ u

(10) L , $(2,0), (-2,0)$ L , $I = \oint_L \left[\frac{y}{(2-x)^2+y^2} + \frac{y}{(2+x)^2+y^2}\right] dx + \left[\frac{2-x}{(2-x)^2+y^2} + \frac{2+x}{(2+x)^2+y^2}\right] dy,$ L

(10) $4x^4 y''' - 4x^3 y'' + 4x^2 y' = 1$ $y = ax^{-1}$

(10) $\frac{x^2}{4}+y^2=1$, x y ,

(10) $0<K=\sqrt{a^2+b^2}<r<R,\quad D:r^2\leqslant x^2+y^2\leqslant R^2,$

$$\frac{\pi\left(R^2-r^2\right)}{R+K}\leqslant\iint_D\frac{d\sigma}{\sqrt{(x-a)^2+(y-b)^2}}\leqslant\frac{\pi\left(R^2-r^2\right)}{r-K}$$

(10) $f(x)$ $[0,1]$, $f(0)=0,f(1)=1,$ $[0,1]$ $x_1,x_2,$ $\frac{1}{f'(x_1)}+\frac{1}{f'(x_2)}=2$

(10) $\sum\limits_{n=1}^{\infty}u_n$ $u_n>0,n=1,2,\cdots,\{v_n\}$, $a_n=\frac{u_nv_n}{u_{n+1}}-v_{n+1},$ $\lim\limits_{n\to\infty}a_n=a,$ a , $\sum\limits_{n=1}^{\infty}u_n$

2006

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1. 150 , 180
2. ,

(10) $\lim\limits_{x\to\infty}\left(\frac{x+1}{x-1}\right)^x$

(10) a,b , $f(x)=\begin{cases}\sin a(x-1) & x\leqslant 1\\ \ln x+b & x>1\end{cases}$ $x=1$

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

(10) $z=f(u)$, $u=q(u)+\int_y^x p(t)dt$ u x,y , $f(u),q(u)$, $p(t)$, $q(u)\neq 1$, $p(y)\frac{\partial z}{\partial x}+p(x)\frac{\partial z}{\partial y}$

(10)

$$F(x)=\begin{cases}\dfrac{\int_0^x tf(t)dt}{x^2} & x\neq 0\\ A & x=0\end{cases}$$

, $f(0)=0$

(1) A , $F(x)$ $x=0$

(2) $F'(x)$ $x=0$

(10) $f(x)$ $\int \sqrt{x} f(x)dx = \frac{1}{\sqrt{x}} + \int x^{\frac{3}{2}} \sin x dx + C,$ $\int f(x)dx$

(10) $x > 0$ $f(\ln x) = \frac{1}{\sqrt{x}}$ $\int_{-2}^{2} x f'(x)dx$

(10) $\pi_1 : x + 2y + 3z - 2 = 0$ $\pi_2 : 6x - y - 5z + 23 = 0$

(10) $f(x) = \ln\left(\frac{x}{1-x}\right)$ $x - 1$

(10) $\sum_{n=1}^{\infty} \frac{1}{n2^n} x^{n-1}$

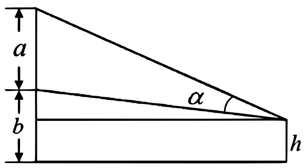
(10) $I=\int_L \frac{(x-y)dx+(x+y)dy}{x^2+y^2}$, L $y=2x^2-1$ $A(-1,1)$ $B(1,1)$

(10) $\int_L \left(f'(x)+2f(x)+e^x\right)ydx+f'(x)dy$ $f(0)=0, f'(0)=1$, $I=\int_{(0,0)}^{(1,1)}\left(f'(x)+2f(x)+e^x\right)ydx+f'(x)dy$

(10) $f(x)$ $[a,b]$ (a,b) , $\xi\in(a,b)$ $2\xi[f(b)-f(a)]=(b^2-a^2)f'(\xi)$

(10) $f(x)$ 2 $f(1+x)+2f(1-x)=2x+\sin^2 x$, $y=f(x)$ $x=3$

(10) , a , b h $h<b$, , ?



2005

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1. 150 , 180
2. ,

(5 5 25)

(1) $f'(x_0)=3$, $\lim\limits_{x\to 0}\frac{f(x_0)-f(x_0-2x)}{x}=$ ____________

(2) $f(x)$ e^{x^2}, $\int xf'(x)dx=$ ____________

(3) $u=x^2+2y^2+3z^2$ $(1,1,-1)$ ____________

(4) $\sum\limits_{n=1}^{\infty}\frac{x^{2n}}{2^n+3^n}$ ____________

(5) $y'+\frac{1}{x}=1$ ____________

(5 5 25)

(1) $f(0)=0$, $f(x)$ $x=0$ ( )

A. $\lim\limits_{t\to 0}\frac{1}{t^2}f(t^2)$ B. $\lim\limits_{t\to 0}\frac{1}{t^2}f(t-\sin t)$

C. $\lim\limits_{t\to 0}\frac{1}{t}f(\ln(1+t))$ D. $\lim\limits_{t\to 0}\frac{1}{t^2}[f(2t)-f(t)]$

(2) $x^2+y^2-\frac{z^2}{4}=1$ $(1,1,2)$ L, $L_1:\frac{x-1}{2}=\frac{y-2}{1}=\frac{z-1}{0}$; $\pi: x+y+4z=1$, ( )

A. L L_1 , L π B. L L_1 , L π

C. L L_1 , L π D. L L_1 , L π

(3) S $x^2+y^2=R^2(0\leqslant z\leqslant R)$, $\iint_S(x^2+y^2)\,dxdy$ ( )

A. $2\pi R^3$ B. $2\pi R^4$ C. πR^4 D. 0

(4) $\sum\limits_{n=1}^{\infty}a_n$, ( )

A. $\sum\limits_{n=1}^{\infty}a_n$ B. $\sum\limits_{n=1}^{\infty}\sqrt[n]{n}a_n$ C. $\sum\limits_{n=1}^{\infty}\frac{(-1)^n}{\sqrt{n}}a_n$ D. $\sum\limits_{n=1}^{\infty}\frac{a_n}{n}$

(5) $f(x)=x-L(0\leqslant x\leqslant 2L)$, $2L$ $x=-\frac{L}{2}$ ( )

A. $-\frac{L}{2}$ B. $-\frac{3L}{2}$ C. $\frac{L}{2}$ D. $\frac{3L}{2}$

(5 8 40)

(1) $\lim\limits_{x\to 0}\frac{\sin x-\sin(\sin x)}{x^3}$

(2) $\int_0^{+\infty}\frac{x}{(2+x^2)\sqrt{1+x^2}}dx$

(3) $\int_0^1\frac{x^6}{\sqrt[6]{1-x^6}}dx$

(4) $f(u,v)$, $z=f\left(xy^2,\frac{y}{x}\right)$, $\frac{\partial z}{\partial x},\frac{\partial^2 z}{\partial x\partial y}$

(5) $\int_0^1 dx\int_{\sqrt[3]{x}}^1\cos y^2 dy$

(3 12 36)

(1) $f(x)$, $f(x)=1, f'(0)=1,$ $\int_L\left(e^x\sin y+2yf'(x)+2xy\right)dx+\left(f'(x)+f(x)+2x+e^x\cos y\right)dy$

i. $f(x)$

ii. L $(0,0)$ $y=x^4$ $(1,1)$,

(2) $y=\arctan x-\frac{1}{2}\ln\left(1+x^2\right)$ $x=0$, $\sum\limits_{n=0}^{\infty}\frac{(-1)^n}{(2n+1)(2n+2)}$

(3) $f(x)=\begin{cases}\pi & -\pi\leqslant x\leqslant 0\\ \pi-x & 0\leqslant x\leqslant\pi\end{cases}$ ( ) $\sum\limits_{n=1}^{\infty}\frac{1}{(2n-1)^2}$

(2 12 24)

(1) $f(x)$ $[0,1]$ $(0,1)$, $f(0)=0, f(1)=2$, :

i. $\xi \in (0,1)$ $f(\xi)=1$

ii. $0<x_1<x_2<1$, $\frac{1}{f'(x_1)}+\frac{1}{f'(x_2)}=1$

(2) i. $F(x)=\int_0^a |t-x| dt$ ($a>0$) $[0,a]$

ii. $f(x)$ $[0,a](a>0)$ $\int_0^a f(x)dx=0, \int_0^u xf(x)dx=1$, : $x_0 \in [0,a]$ $|f(x_0)| \geqslant \frac{4}{a^2}$

2004

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1. 150 , 180
2. ,

(5 5 25)

(1) $\lim\limits_{n\to\infty}\sqrt[n]{\sin 1+\sin\frac{1}{2}+\cdots+\sin\frac{1}{n}}=$ __________

(2) $y-\epsilon\sin y=x$ ($\epsilon\in(0,1)$), $\frac{d^2y}{dx^2}=$ __________

(3) $\int_0^{+\infty}\frac{\ln\left(1+x^2\right)}{x^\alpha}dx$ __________

(4) $z=\arctan\frac{y}{x}$ $\left(1,1,\frac{\pi}{4}\right)$ __________

(5) $y''-3y'+2y=\cos x$ __________

(5 5 25)

(1) S $x^2+y^2+z^2=R^2$ $\oiint_S x^2dydz+y^2dzdx+zdxdy=($ $)$

A. 0 B. πR^4 C. $2\pi R^4$ D. $4\pi R^4$

(2) $y=\sqrt{x^2+1}-x-1$ ( )

A. 0 B. 1 C. 2 D. 3

(3) $\{A_n\}$, $A_1=a, \lim\limits_{n\to\infty}A_n=+\infty$, $f(x)$ $[a,+\infty)$ $\int_a^{+\infty}f(x)dx$ $\sum\limits_{n=1}^{\infty}\int_{A_n}^{A_{n+1}}dx$ ( )

A. B. C. D.

(4) $\sum\limits_{n=2}^{\infty}\ln\left[1+\frac{(-1)^n}{n^p}\right]$ $(p>0)$ ( )

A. $0<\leqslant 1$ B. $p>1$ C. $\frac{1}{3}<p\leqslant 1$ D. $\frac{1}{2}<p<\leqslant 1$

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

A. $f(x,y)$ $(0,0)$ $\frac{\partial f}{\partial x},\frac{\partial f}{\partial y}$ $(0,0)$ B. $f(x,y)$ $(0,0)$ $\frac{\partial f}{\partial x},\frac{\partial f}{\partial y}$ $(0,0)$

C. $f(x,y)$ $(0,0)$ $\frac{\partial f}{\partial x},\frac{\partial f}{\partial y}$ $(0,0)$ D. $f(x,y)$ $(0,0)$ $\frac{\partial f}{\partial x},\frac{\partial f}{\partial y}$ $(0,0)$

(5 8 40)

(1) $\lim\limits_{x\to 0}\frac{\int_0^{\tan x}t(\tan t-t)dt}{\int_0^{\sin^2 x}\sin^{\frac{3}{2}}tdt}$

(2) $\int_0^{\ln 2}\sqrt{e^x-1}dx$

(3) $\int_0^{\frac{\pi}{2}}(\tan x)^{\frac{2}{3}}dx$

(4) Stokes

$$\oint_L (y-z)dx + (z-x)dy + (x-y)dz$$

$L: \begin{cases} x^2+y^2+z^2=a^2 \\ x+y+z=0 \end{cases}$ $(a>0)$ x L

(5) $a,b>0$ $y>x>0$ $(a^x+b^x)^{\frac{1}{x}} > (a^y+b^y)^{\frac{1}{y}}$

(3 12 36)

(1) $x^2+y^2=az$ $z=2a-\sqrt{x^2+y^2}(a>0)$

(2) $\sum\limits_{n=1}^{\infty}\left[n(n+1)-\frac{1}{n(n+1)}\right]x^n$,

(3) k , $\frac{k}{r}+x^2=1$

(2 12 24)

(1) $f(x)=\begin{cases} x & -\pi \leqslant x \leqslant 0 \\ \pi x & 0 < x \leqslant \pi \end{cases}$ ( ), $\sum\limits_{n=1}^{\infty}\frac{1}{n^2}$

(2) λ, $\frac{x}{y}\left(x^2+y^2\right)^{\lambda}dx-\frac{x^2}{y^2}\left(x^2+y^2\right)^{\lambda}dy=0$ $D=\{(x,y)\mid y>0\}$,

(1) $f(x)$

$$\begin{aligned} f(x) &= \frac{\pi}{4}(\pi-1)+\sum_{n=1}^{\infty}\left\{-\frac{\pi-1}{n^2\pi}\left[(1-(-1)^n\right]\cos nx+\frac{\pi+1}{n}(-1)^{n+1}\sin nx\right\} \\ &= \begin{cases} x, & -\pi < x \leqslant 0 \\ \pi x, & 0 \leqslant x < \pi \\ \frac{\pi(\pi-1)}{2}, & x=\pm\pi \end{cases} \end{aligned}$$

$x=0$ $\sum\limits_{n=1}^{\infty}\frac{1}{n^2}=\frac{\pi^2}{8}$

(2) $\lambda=\frac{1}{2}$ $\frac{\sqrt{x^2+y^2}}{y}=C$

2003

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1. 150 , 180
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(5 5 25)

(1) $\lim_{x \to \frac{\pi}{4}} \frac{\sqrt[3]{\tan x} - 1}{2\sin^2 x - 1}$ ____________

(2) $\begin{cases} x = \displaystyle\int_1^{t^2} u \ln u du \\ y = \displaystyle\int_{t^2}^{1} u^2 \ln u du \end{cases}$ $(t > 0)$, $\frac{d^2y}{dx^2} =$ ____________

(3) $\sum_{n=0}^{\infty} \frac{1}{2n+1} \left(\frac{1-2x}{1+x}\right)^n$ ____________

(4) $x^2 + 2y^2 + z^2 = 1$ $x - y + 2z = 0$ ____________

(5) $y'' + 2y' - 2y = 4xe^x$ ____________

(5 5 25)

(1) $f(x) = \begin{cases} |x|^a \arctan \frac{1}{x} & x \neq 0 \\ x & x = 0 \end{cases}$ $x = 0$, a ( )

A. $a > 0$ B. $0 < a \leqslant 1$ C. $0 < a < 1$ D. $a > 1$

(2)

(3) " $\epsilon > 0$, N, $n > N$ $| a_{N+1} + a_{N+2} + \cdots + a_N | < \epsilon$" $\sum_{n=1}^{\infty} a_n$ ( )

A. B. C. D.

(4) s $x^2 + y^2 = R^2$ $z = 0$ $z = R$ $\iint_S (x^2 + z^2)\, dS =$ ( )

A. $\frac{8}{3}\pi R^4$ B. $\frac{5}{3}\pi R^4$ C. $\frac{4}{3}\pi R^4$ D. πR^4

(5) L $A(-1, 0)$, $B(1, 0)$, A, B x , $\int_L \frac{-ydx + xdy}{x^2 + y^2}$ ( )

A. $-\pi$ B. 0 C. π D. L

(6) $\int_0^{+\infty} \frac{\sin x^2}{x^p} dx$ ( )

A. $p > -1$ B. $0 < p < 3$ C. $-1 < p < 1$ D. $-1 < p < 3$

(5 8 40)

(1) $\int \max(x, 1) dx$

(2) $\int_1^{+\infty} \frac{1}{x(x^m + 1)} dx$, m

(3) $G = \sqrt[n]{(n+1)(n+2) \cdots (n+n)}$, $\lim_{n \to} \frac{G_n}{n}$

(4) $x > 0$ $\left(1 + \frac{1}{x}\right)^x < e < \left(1 + \frac{1}{x}\right)^{x+1}$

(5) $f(x)$ $[0,+\infty)$, $x \geqslant 0,\ \ f(x) \leqslant e^{-x},\ \ f(0)=1$ $\xi > 0,\ \ f'(\xi) = -e^{-\xi}$

(3 12 36)

(1) $z = x^2y(3-x-y)$ $D: x \geqslant 0, y \geqslant 0, x+y \leqslant 4$

(2) $f(x) = \cos x + \frac{1}{4}\int_0^{2\pi}(2x-t)f\left(\frac{t}{2}\right)dt,$ $f(x)$ $f(x)$

(3) $a, b, c > 0,$ $x^2 + y^2 + \frac{a^2-b^2}{c^2}z^2 = a^2$ $|z| \leqslant c$

(2 12 24)

(1) $f(x) = \begin{cases} \dfrac{\pi - 1}{2}x & 0 \leqslant x \leqslant 1 \\ \dfrac{\pi - x}{2} & 1 < x \leqslant \pi \end{cases}$ $f(x)$ 2π , $\sum\limits_{n=1}^{\infty} \frac{\sin^2 n}{n^2}$ $\sum\limits_{n=1}^{\infty} \frac{\sin^2 n}{n^4}$

(2) c $2x^2 + y^2 - z^2 = 1$ $z = 1, z = -1$, S c $\vec{v} = (2x^2 + y^2 + z^2)^{-\frac{3}{2}} (x\vec{i} + y\vec{j} + z\vec{k})$

i. $\operatorname{div} \vec{v}$

ii. $\iint_S \frac{adydz + ydzdx + zdxdy}{(2x^2+y^2+z^2)^{\frac{3}{2}}}$

2002

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(5 3 15)

(1) $\lim\limits_{n\to\infty}\cos\frac{1}{2}\cos\frac{1}{4}\cdots\cos\frac{1}{2^n}=$ ___________

(2) $\int\frac{\cos x dx}{1+e^{\sin x}}$ ___________

(3) $z=z(x,y)$, $yz+zx+xy=1$, $dz=$ ___________

(4) $\int_0^{+\infty}\frac{\sin\frac{1}{x}}{x^p}dx$ ___________

(5) $y''+4y'+4y=e^x$ ___________

(5 3 15)

(1) $\begin{cases} ax+b & x\leqslant 9 \\ x^2\cos\frac{1}{x} & x>0 \end{cases}$ $x=0$, ( )

A. $a=1,b=0$ B. $a=0,b=0$ C. $a=1,b=1$ D. $a=0,b=1$

(2) $f(x)$ $[-L,L]$ $f''(x)>0,\lim\limits_{x\to0}\frac{f(x)}{x}=1$, ( )

A. $(-L,0)$ $0,L$ $f(x)>x$ B. $(-L,0)$ $0,L$ $f(x)<x$

C. $(-L,0)$, $f(x)>x$; $0,L$, $f(x)<x$ D. $(-L,0)$, $f(x)<x$; $0,L$, $f(x)>x$

(3) L $\{\ x^2+y^2+z^2=a^2$, $\int_L(x^4+2y^2z^2)\,dL=$ $x+y+y=0$ ( )

A. $\frac{\pi a^5}{3}$ B. $\frac{2\pi a5}{3}$ C. πa^5 D. $2\pi a^5$

(4) , ( )

A. $\sum\limits_{n=1}^{\infty}\left(e^{\frac{1}{n}}-1\right)$ B. $\sum\limits_{n=1}^{\infty}\frac{\sin n}{n}$ C. $\sum\limits_{n=1}^{\infty}\frac{(-1)^n}{e^{\sqrt{n}}+1}$ D. $\sum\limits_{n=1}^{\infty}\frac{(-1)^n}{\sqrt[n]{e}+1}$

(5) $a+|x|=\pi-\frac{4}{\pi}\sum\limits_{n=1}^{\infty}\frac{\cos(2n-1)x}{(2n-1)^2}$, $-\pi\leqslant x\leqslant\pi, a$ $a=($ $)$

A. $\frac{\pi}{2}$ B. $-\frac{\pi}{2}$ C. π D. $-\pi$

(3 6 18)

(1) $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{\cos x}{1+e^x} dx$

(2) $\int_0^1 (1-\sqrt{x})^n dx$

(3) $f(x)$ $f''(x)+[f'(x)]^2=\sin x,$ $f'(0)=0$: $x=0$ $f(x)$

(4 7 28)

(1) $\lim_{n\to\infty} \sqrt[n]{1+e^{nx}+e^{-nx}}$

(2) $I=\oint_L z^2dx+(x^2+xy-x)\,dy+2xzdz,$ L $z=x^2+y^2$ $x^2+4y^2=1$ z , L

(3) $y=\arctan\frac{3+x}{3-x}$ x ,

(4) $(x-x^3y^2\ln y)\,y'=2y$

(3　　8　24)

(1)　$S: \sqrt{x}+\sqrt{y}+\sqrt{z}=\sqrt{a}(a>0)$,　S　　,

(2)　$f(x)$　2π　　,　$(\pi,\pi]$

$$f(x)=\begin{cases} 0 & -\pi<x<0 \\ 1 & 0\leqslant x\leqslant 1 \\ 0 & 1<x\leqslant \pi \end{cases}$$

$f(x)$　　(　　),　$\sum\limits_{n=1}^{\infty}\frac{\sin n}{n}$　$\sum\limits_{n=1}^{\infty}\frac{1-\cos n}{n^2}$

(3)　Ω　$x=0, y=0, x+y=1, z(x+y)=1$　$z=1$

i.　Ω　V

ii.　$\iiint_\Omega \frac{dxdydz}{x^2+y^2+z^2}\leqslant \frac{V}{2}$

2001

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(3 15)

(1) $F(x)=\frac{x^2}{x-a}\int_a^x f(t)dt$, $f(x)$, $\lim\limits_{x\to a}F(x)$ ___________

(2) $(3,1,-1)$ $\frac{x-4}{5}=\frac{y+3}{2}=\frac{z}{1}$: ___________

(3) $\lim\limits_{x\to 0}\frac{\sqrt{1+x}+\sqrt{1-x}-2}{x^2}=$ ___________

(4) $y''+y'+y=0$ ___________

(5) $f\left(\frac{z}{x},\frac{y}{z}\right)=0$ $z=z(x,y)$, $\frac{\partial z}{\partial x}=$ ___________

(10) $y=y(x),z=z(x)$ $z=xf(x+y)$ $F(x,y,z)=0$, f F , $\frac{dz}{dx}$

(12)

(1) (5)

$$\int_0^\pi \frac{\sin\theta}{\sqrt{1-2a\cos\theta+a^2}},(a>1)$$

(2) (7)

$$I=\iint_S\left(x^2+y^2\right)dS$$

S : $z=\sqrt{x^2+y^2}$ $z=1$

(8) $f(x)=\arctan\frac{1+x}{1-x}$ x

(20)

$$\begin{cases} \frac{dx}{dt} = 3x + 2y - z \\ \frac{dy}{dt} = -2x - 2y + 2z \\ \frac{dz}{dt} = 3x + 6z - z \end{cases}$$

(1) $\frac{d}{dt}X(t) = AX(t)$ $X(t) = (x(t), y(t), z(t))'$, A 3 , "′" (2)

(2) A (10)

(3) T D $T^{-1}AT = D$ (3)

(4) (5)

(5) A $m \times n$, A $r > 0$ r $m \times r$ B r $r \times n$ C, $A = BC$

(5) $f(z) = u(x, y) + iv(x, y)$ D , $\overline{f(z)} = u - iv$ $g(z) = v + iv$ D

(5)

$$\int |z| = 3 \left[\bar{z} + (z-1)^5 \cos \frac{1}{(z-1)^3} \right] dz$$

$\bar{z}$ z

(12)

$$|x| = \begin{cases} \frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0 & (x,y) \in D, D: -\infty < x < 0, 0 < y < \pi \\ u|_{x=0} = \frac{y}{\pi},\, u|_{x=-\infty} & (0 < y < \pi) \\ u|_{y=0} = 0,\, u|_{y=pi} = 0 & (-\infty < x < 0) \end{cases}$$

(8)

(1) D (6)

(2) Laplace Green Laplace D Green $\bar{z}$ z (2)

$$G(z; z_0) = \frac{1}{2\pi} \left(\ln \frac{1}{|z - z_0|} - \ln \frac{1}{|z - \bar{z}|} \right)$$