Документ подписан простой электронной подписью
Информация о владельце:
ФИО: Таскаев Сергей Валерьевич
Должность: Ректор
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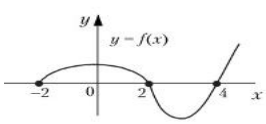
4 4 4		
0 4 . 4 4	56 3 - 0 5, $y=\frac{2^{\sqrt{x}}}{\sqrt{3}}y=\frac{2^{\sqrt{x}}}{\sqrt{3}}$; , $y=\left(\frac{2}{\sqrt{3}}\right)^x y=\left(\frac{2}{\sqrt{3}}\right)^x$, $y=\arcsin x$ $y=\arcsin x$, $y=\arcsin(3x)y=\arcsin(3x)$6	5
	; 6 3 - 0 5, $y=\sin^3\ln x y=\sin^3\ln x$; , $y=tg(x+y)\cdot 3^x$ $y=tg(x+y)\cdot 3^x$, $x-y=xyx-y=xy$6	;
	6 3 - 0 5, $y=e^{-x^2}y=e^{-x^2}$; , $y=e^{x^2}y=e^{x^2}$, $y=\frac{\cos x}{x^2}y=\frac{\cos x}{x^2}$, $y=\sin x+\cos x y=\sin x+\cos x$6	5
	6 3 - 0 . $x\in(-\infty;+\infty)x\in(-\infty;+\infty)$ 5, $y=x^2y=x^2$; , $y=x^3y=x^3$, $y=\begin{cases}x, \text{при } x<0\\2x, \text{при } x\geq 0\end{cases}$ $y=\begin{cases}x, \text{при } x<0\\2x, \text{при } x\geq 0\end{cases}$, $y=\sqrt[3]{x}y=\sqrt[3]{x}$ 6	;
	6 3 - 0 5, $y=\frac{x}{\cos x}+\sin x y=\frac{x}{\cos x}+\sin x$; , $y=\frac{x(x+1)}{\sin x}y=\frac{x(x+1)}{\sin x}$, $y=x^3+tg\,x y=x^3+tg\,x$, $y=x^3\cdot tg\,x y=x^3\cdot tg\,x$6	5
	6 - 0 $y=\arcsin x$ $y=\arcsin x$ 5, ; , , , , , , , 6	5 ;
	6 1 xx . 4 - 0 $y=\frac{\ln(x^2-9)}{x-4}+\frac{\sqrt{9-x}}{2^x-64}y=\frac{\ln(x^2-9)}{x-4}+\frac{\sqrt{9-x}}{2^x-64}$	
	6 YY - 0 $y=\sin x+\sqrt{80}\cos x$ $y=\sin x+\sqrt{80}\cos x$6 3. 4 YY6 	;
	6 (1, (, . - 0 $y=7\sin 5x$ $y=7\sin 5x$ 6	;
	5 6 - - 0 $y=f(x)y=f(x)$6 4	;

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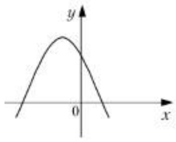
	1 1 $f(4x^2+3)=0$ $f(4x^2+3)=0$6	
	556 3 3 3 3 - - 0 $y=a(x+b)^2+c$ $y=a(x+b)^2+c$ 5, <3 <3 < ; , <3 <3 < , <3 <3 < >, <3 <3 < , <3 <3 <6 	;
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	; 6 3 . 1 - 0 . $x\to 0$ $x\to 0$ 5, $y=\frac{1}{x}$ $y=\frac{1}{x}$; , $y=x^{10}$ $y=x^{10}$, $y=\sin\frac{x}{3}$ $y=\sin\frac{x}{3}$ >, $y=\cos 2x$ $y=\cos 2x$, $y=\frac{1}{\cos 3x}$ $y=\frac{1}{\cos 3x}$6	;
	6 3 . 1 - 0 . $x\to\infty$ $x\to\infty$ 5, $y=\sqrt[3]{x}$ $y=\sqrt[3]{x}$; , $y=\operatorname{tg}x$ $y=\operatorname{tg}x$, $y=\log_{0,5}x$ $y=\log_{0,5}x$ >, $y=\frac{1}{x^{-2}}$ $y=\frac{1}{x^{-2}}$, $y=\operatorname{arctg}x$ $y=\operatorname{arctg}x$6	5 >
	>6 2 1 1 4 5, ; , , . 6	
	6 3 1 . 1 - 0 . $x=0$ $x=0$ 5, $y=\frac{1}{x}$ $y=\frac{1}{x}$; , $y=\sqrt{x}$ $y=\sqrt{x}$, $y=\begin{cases}1, \text{при } x\le 0,\\ x, \text{при } x>0;\end{cases}$ $y=\begin{cases}1, \text{при } x\le 0,\\ x, \text{при } x>0;\end{cases}$ >, $y=\begin{cases}-x, \text{при } x<0,\\ 1, \text{при } x=0,\\ x, \text{при } x\ge 0;\end{cases}$ $y=\begin{cases}-x, \text{при } x<0,\\ 1, \text{при } x=0,\\ x, \text{при } x\ge 0;\end{cases}$, 6 $y=\operatorname{tg}x$ $y=\operatorname{tg}x$	; >
	6 $\lim_{x\to\infty}\frac{3x^2-2x-10}{2x^2+7x+5}$ $\lim_{x\to\infty}\frac{3x^2-2x-10}{2x^2+7x+5}$	5
	6 $a=\lim_{x\to\infty}(\frac{x^2+5}{x^2+3})^{x^2}$ $a=\lim_{x\to\infty}(\frac{x^2+5}{x^2+3})^{x^2}$ 3 $\ln a$ $\ln a$6	;
	6 $\lim_{x\to+\infty}(\sqrt[3]{x^3+6x^2}-x)$ $\lim_{x\to+\infty}(\sqrt[3]{x^3+6x^2}-x)$6	;

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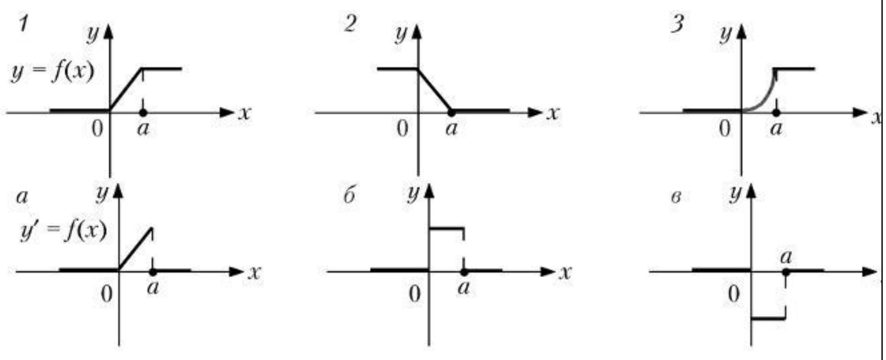
	6 $\lim_{x\to+\infty}(\frac{x+3}{2x-5})^{6x}\lim_{x\to+\infty}(\frac{x+3}{2x-5})^{6x}$6	
	5 6 aa 3 $\lim_{x\to\infty}\frac{5x^4+3x^2-18}{ax^4-18x^2+3}=\frac{1}{2}\lim_{x\to\infty}\frac{5x^4+3x^2-18}{ax^4-18x^2+3}=\frac{1}{2}$6	5
	556 aa 3 $\lim_{x\to0}\frac{\operatorname{tg} ax}{8x}=2\lim_{x\to0}\frac{\operatorname{tg} ax}{8x}=2$6	5
2 4 - 4 - 4 4 0 - 0 4 . 4 4	56 3 - 0 . 3 - - 4 0 1 5, $y=\|x+2\|, x_0=2 y=\|x+2\|, x_0=2$;, $y=x-5, x_0=5 y=x-5, x_0=5$, $y=\sqrt[5]{x-8}, x_0=8 y=\sqrt[5]{x-8}, x_0=8$, $y=\operatorname{tg}(x+\frac{\pi}{4}), x_0=\pi y=\operatorname{tg}(x+\frac{\pi}{4}), x_0=\pi$ =, $y=\sqrt{3x^2-4x+1}, x_0=0 y=\sqrt{3x^2-4x+1}, x_0=0$6	;
	;6 3 - 0 - - 0 4 $x_0 x_0$ 5 5, $y=\operatorname{tg}(1+\sqrt{x}) y=\operatorname{tg}(1+\sqrt{x})$;, $y=x\arccos x y=x\arccos x$, $y=\sqrt[5]{x^2-8x+3} y=\sqrt[5]{x^2-8x+3}$, $y=x^2\ln(1-x^2) y=x^2\ln(1-x^2)$ =, $y=\|3x-2\|. y=\|3x-2\|.$	5 =
	62 . aa - 0 $y=\ln(x+a\sqrt{x^2-1})$ $y=\ln(x+a\sqrt{x^2-1})$ - - 0 $x_0=1$ $x_0=1$	
	6 - - 0 1 . 4  	54 ;4 4
	=6 . 1 - 0 $x_0 x_0$ $y=(x^2+5x-4)\ln x, x_0=1$	;

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	$y = ln(e^{2x}+\sqrt{e^x+1}) - 2\sqrt{2x}y = ln(e^{2x}+\sqrt{e^x+1})-2\sqrt{2x}$ $x_0 = 0x_0 = 0$	
	6 . - 0 $x^2 + 2xy^2 + 3y^4 = 6x^2 + 2xy^2 + 3y^4 = 63$ (; 45,6	
	6 . - 0 $x = \text{arctg}\,t\ x = \text{arctg}\,t$ 3 $y = \text{arctg}\sqrt{t-1}y = \text{arctg}\sqrt{t-1}3$ . . $t = 2t = 26$	3
	6 - - 0 - 0 $y = \frac{5}{11}(\text{arctg}(1+x^2)-\sqrt{3x^2+1})y = \frac{5}{11}(\text{arctg}(1+x^2)-\sqrt{3x^2+1})$□ . $x_0 = 1, \Delta x = 0{,}1x_0 = 1, \Delta x = 0{,}16$	53;
	6 . (. - - 0 , $In\ 1{,}05.$ $In\ 1{,}05.$	4 3
	5 6 - $y = 4x^2 - x\ y = 4x^2 - x$ $x_0 = 3x_0 = 36$ $y = kx + b, y = kx + b,$ $k = \ldots; b = \ldots$ $k = \ldots; b = \ldots$	3
	556 2 _ x_0x_0 - - 0 $y = 2\sqrt{2}\ln(\sqrt{x}+\sqrt{x+1})y = 2\sqrt{2}\ln(\sqrt{x}+\sqrt{x+1})$ 0 . 45°45°	4;
2 4 - 4 - 4 4 0 - 0 4 . 4 4	562 . . 1 . 4 5, $\lim_{x\to\infty}\frac{2^x-x}{x^2-1}\lim_{x\to\infty}\frac{2^x-x}{x^2-1}$;, $\lim_{x\to-1}\frac{\sqrt{1+x}}{x^2-1}\lim_{x\to-1}\frac{\sqrt{1+x}}{x^2-1}$, $\lim_{x\to\infty}\frac{\sqrt{x}+\sin x}{\sqrt{x}-\sin x}\lim_{x\to\infty}\frac{\sqrt{x}+\sin x}{\sqrt{x}-\sin x}$, $\lim_{x\to\infty}\frac{e^x+e^{-x}-2}{x^2}\lim_{x\to\infty}\frac{e^x+e^{-x}-2}{x^2}$6	
	;6 . $\lim_{x\to\infty}(\frac{1+x}{2})^{\frac{1}{x}}\lim_{x\to\infty}(\frac{1+x}{2})^{\frac{1}{x}}$	5
	6 3 . 1 - 0 . ; 5, $y = \frac{2x}{x-2}y = \frac{2x}{x-2}$;, $y = \frac{2x}{x-3}y = \frac{2x}{x-3}$, $y = \frac{x-2}{x+2}y = \frac{x-2}{x+2}$, $y = \ln(1+\sqrt{x})y = \ln(1+\sqrt{x})$6	5
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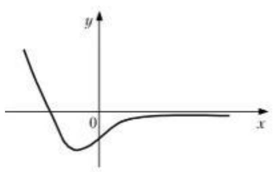
(. 4 4 4 . 4 ,	- 0 5, $y=\frac{2x}{1+x^2}y=\frac{2x}{1+x^2}$; , $y=\frac{2x}{1-x^2}y=\frac{2x}{1-x^2}$, $y=\frac{1-x^2}{x}y=\frac{1-x^2}{x}$, $y=x^3-x^2y=x^3-x^2$, $y=x^3+x^2y=x^3+x^2$6	
	6 - 0 $y=3x+x^3$ $y=3x+x^3$6	;
	6 3 . 1 5, 7 . - 0 4 ; , 7 - 0 , 7 . , 3 . 3 4 7	;
	6 x_0x_0 - 0 $y=x^2(x-4)^2$ $y=x^2(x-4)^2$6	;
	6 . 1 - 0 . - 0 5 $y=3^x-2^xy=3^x-2^x$; , $y=3^x-x^22^xy=3^x-x^22^x$, $y=xe^{-x}y=xe^{-x}$, $y=\frac{2+x^2}{1+x\sqrt{x}}y=\frac{2+x^2}{1+x\sqrt{x}}$	
	6 . 1 4 5, . . . ; , . . , . 7 . . , . 7 .	
	5 6 3 - - 0 5, $y=(x+1)e^xy=(x+1)e^x$; , $y=-(x+1)e^{-x}y=-(x+1)e^{-x}$, $y=(x+1)e^{-x}y=(x+1)e^{-x}$, $y=-(x+1)e^xy=-(x+1)e^x$6  	;
	556 3 - 3. 1 3 4 - - 0 $y=\frac{\ln x}{x}y=\frac{\ln x}{x}$6	;

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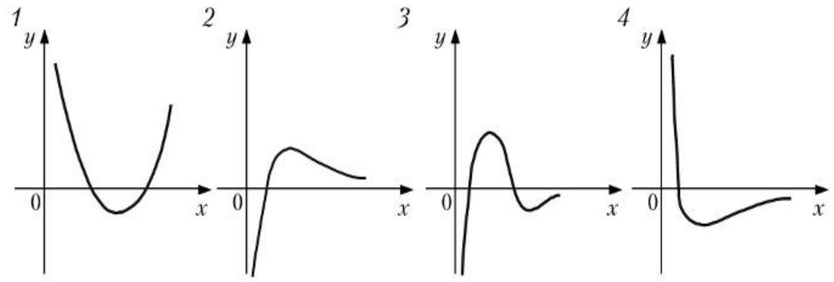
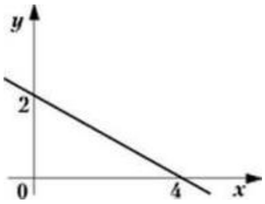
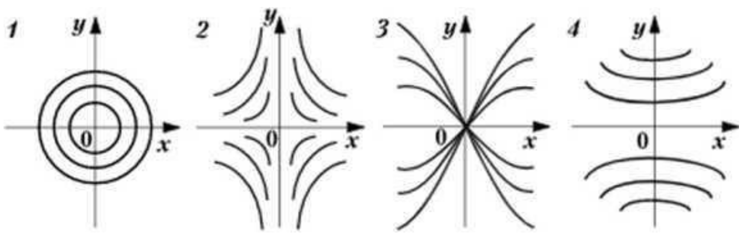
		
	5; 6 - 0 $y = x^3 + x^2$ $y = x^3 + x^2$ 45 ; 6	$f_{наиб}(2) = 12;$ $f_{наим}(1) = f_{наим}(0) =$ $f_{наим}(1) = f_{наим}(0) =$
	5 6 . . . $м^2$ $м^2$ . . . 62 1 4 1 3 . 1	;
0 4 1 . 4 4 1	56 . - 3 . . - 0 $\sqrt{1-x^2-y^2}\sqrt{1-x^2-y^2}$ [35 6	35
	; 6 - 0 $\frac{a}{b}$ $\frac{a}{b}$6 	3=
	6 3 - 0 	;
	6 1 . 1 - 0 $x^{2y}x^{2y}$ (5 5,6	;
	=6 4 - 0 $x^3 + \frac{9}{4}x^2 \ln y$ $x^3 + \frac{9}{4}x^2 \ln y$ (; 5,6	5=

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	6 7- - 0 . 3 . 1 4 - 0 1; ; 1 (45 ,6	3=
	6 - 0 $x^3y^4 + x^2y^3 + 2x$ $x^3y^4 + x^2y^3 + 2x$ (5 ; , 7- - 0 $k = -\frac{a}{b}$ $k = -\frac{a}{b}$3 3 (0 3 $\frac{aa}{bb}$ 4 ,6	;
	6 ($x_0x_0$3y_0y_0, - 0 $\frac{}{y} + x\frac{}{y} + x$	$x_0 = 1$; $y_0 = -1$
	6 0 5, (, ; , (, , 7 , 7 =, 7 6	
	5 6 - 0 $z = 4 - x - x^2 - y - 4y^2$ $z = 4 - x - x^2 - y - 4y^2$ $\frac{aa}{bb}$3 0 3 $\frac{aa}{bb}$ – ,6	5
	556 + - 0 5, ; , , , . =, . 6	
4 . 4	56 2 1 - 0 ()= $\frac{a}{3}x^b + 2x^2 + x + 1$ $= \frac{a}{3}x^b + 2x^2 + x + 1$. () 5,;	3
	; 62 1 0 1 + - 0 () ; a 5 . 4	3 3 5

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	- 0 $f(x) = ae^{bx+c} f(x) = ae^{bx+c}$	
	6 2 1 0 1 + - 0 $F_1(x F_1(x'$ X$\frac{1}{a}(1+bx)^c$ $\frac{1}{a}(1+bx)^c$,) 5 b 453=c . - 0 ()	X4 3 X4 3 X
	>6 $\int \frac{(\sqrt{x}+2)^2}{x} dx. \int \frac{(\sqrt{x}+2)^2}{x} dx.$ $ax + b\sqrt{x} + d\ln\lvert x\rvert + C, ax + b\sqrt{x} + d\ln\lvert x\rvert + C,$ 3 3d 0 X 3 X 3d X	X53 X 3dX>
	5. Найти $\int \left(\frac{17-2x}{3}\right) dx.$ $\frac{3}{a}\left(\frac{17+bx}{3}\right)^d + C, \frac{3}{a}\left(\frac{17+bx}{3}\right)^d + C,$ 3 3d 0 X 3 X 3d X	X4 3 X4 3dX>
	6 $\int \frac{2x+3}{4x-7} dx \int \frac{2x+3}{4x-7} dx$ $\frac{1}{a}x + \frac{b}{d}\ln\lvert 4x-7\rvert + C, \frac{1}{a}x + \frac{b}{d}\ln\lvert 4x-7\rvert + C,$ 3 3d 0 4 3 $\frac{b}{d}\frac{b}{d}$ 3 X 3 X 3d X	X 3 X5 3dX
	6 $\int xe^{x^2-3} dx. \int xe^{x^2-3} dx.$ $\frac{a}{b}e^{x^2+d}\frac{a}{b}e^{x^2+d}$3 3 3d 0 3 $\frac{aa}{bb}$ 4 3 X 3 X 3d X	X53 X 3 dX4
	6 $\int x^3 \ln x\, dx. \int x^3 \ln x\, dx.$ $\frac{1}{a}x^b + \frac{1}{d}x^4 \ln x + c, \frac{1}{a}x^b + \frac{1}{d}x^4 \ln x + c,$ 3 3d 0 3 .	X4 5 3 X> 3 dX>
	6 $\int \frac{dx}{x^2-2x-3} \int \frac{dx}{x^2-2x-3}$ $\frac{1}{a}\ln\left\lvert\frac{x+b}{x+d}\right\rvert + C, \frac{1}{a}\ln\left\lvert\frac{x+b}{x+d}\right\rvert + C,$ 3 3d 0 3 X 3 X 3 d X	X>3 X4 3dX5
	5 6 $\int \frac{dx}{\sqrt{3-2x-x^2}} \int \frac{dx}{\sqrt{3-2x-x^2}}$	X53 X53dX

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	$\arcsin\frac{ax+b}{d}+C\arcsin\frac{ax+b}{d}+C$3 S3 3 d 0 3 S S 3 3 d	
4 4 4	56 - 0 x^2x^2 5 3 >6 $\frac{aa}{bb}$3 . 0 ,6	S 5= ;
	; 62 1 0 1 1 . . 4 $\int_0^1 x\sqrt{e^{x^2+1}}dx=e^a-\sqrt{e^b}$	S
	6 0 . 1 . 4 $\int_1^{e-1}\ln(x+1)dx=a+2\ln b$	S
	>6 . $\int_1^2\frac{dx}{x^2+7x}$ $\frac{1}{a}\ln\frac{91}{ba}\ln\frac{9}{b}$3 S 3 (S 0 ,6	S 4 5
	=6 2 . S $\int_0^3\frac{ax+1}{x+1}dx\int_0^3\frac{ax+1}{x+1}dx$. - 3 $y=\frac{x-2}{x+1},y=-2,x=3?y=\frac{x-2}{x+1},y=-2,x=3?$ 7 . 6 . 0 $S=9-\ln b,S=9-\ln b,$ (S 0 ,6	S 5
	6 $y=\frac{2}{3}\sqrt{(x-1)^3}y=\frac{2}{3}\sqrt{(x-1)^3}$ 4 5 > 6 $\frac{a}{b},\frac{a}{b},$ S 3 (S . 0 3 $\frac{aa}{bb}$,6	S 5>
	6 3. . 0 . - 3 $x=y^2,\ x=4y-y^2,x=0.$ $x=y^2,\ x=4y-y^2,x=0.$ $\frac{a\pi}{3},\frac{a\pi}{3},$ S	S 55;
	62 - . 0 . 4 .	>

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	$\int_1^5 \ln x\,dx$ с точностью до 0,001?$\int_1^5 \ln x\,dx$ с точностью до 0,001?	
	. - 3 $y = (2x-3)e^{-x}$$y = (2x-3)e^{-x}$ . . ,	
	5 + . $\int_0^e \frac{dx}{x\ln^3 x}$$\int_0^e \frac{dx}{x\ln^3 x}$3 1 4	4 3
4 4	5 5 1 3 5, 5, . 1 . ;, ;, . , , . 1 . , , . , , . 1 4	
	; ; 1 2 1 1 5, 5, 1 ;, ;, 1 , , 1 , , 1 4 , , 3 1 1	;
	1 1 $1)\sum_{n=1}^{\infty}\frac{1}{n^2};\quad 2)\sum_{n=1}^{\infty}\frac{1}{\sqrt{n}};\quad 3)\sum_{n=1}^{\infty}\left(\frac{1}{2}\right)^n;\quad 4)\sum_{n=1}^{\infty}3^n;\quad 5)\sum_{n=1}^{\infty}\frac{1}{n}.$	5
	4	54; ; 4 45 4

	а) $\sum_{n=1}^{\infty}\frac{(-1)^n n^2}{n+4}$; 1) $\lim_{n\to\infty} u_n = 1$, ряд расходится; б) $\sum_{n=1}^{\infty}\frac{3}{n}$; 2) $\lim_{n\to\infty} u_n = \infty$, ряд расходится; в) $\sum_{n=1}^{\infty}\frac{4n+3}{4n-1}$; 3) $\lim_{n\to\infty} u_n = 0$, для ответа на вопрос о сходимости ряда требуется . г) $\sum_{n=1}^{\infty}\frac{3n-1}{5n^2+7}$. 4) $\lim_{n\to\infty} u_n = 0$, ряд сходится.	
	6 6 1 $\sum_{n=1}^{\infty}u_n \sum_{n=1}^{\infty}u_n$ 4 3 $v_n = \frac{1}{n^\alpha} v_n = \frac{1}{n^\alpha}$ . . . 4 $\lim_{n\to\infty}\frac{u_n}{v_n} = k, k \neq 0, k \neq \infty$. $\lim_{n\to\infty}\frac{u_n}{v_n} = k, k \neq 0, k \neq \infty$. 1 1 (5 1 ; 1 , а) $\sum_{n=1}^{\infty}\frac{3n-7}{n^2+\sqrt{n^2+7}}$; б) $\sum_{n=1}^{\infty}\frac{3n-7}{n^2\sqrt{n^2+7}}$ 6	, $\alpha = 1 \alpha = 1$; , $\alpha = 2 \alpha = 2$ 5
	6 $\sum_{n=1}^{\infty}u_n \sum_{n=1}^{\infty}u_n$ $u_n = \frac{5^n}{n+2^n} u_n = \frac{5^n}{n+2^n}$ $l = \lim_{n\to\infty}\frac{u_{n+1}}{u_n} l = \lim_{n\to\infty}\frac{u_{n+1}}{u_n}$ 7 1 (5 1 3; 1 3 . 4 ,6 6	$l = \frac{5}{2}$;2
	6 6 2 $\sum_{n=1}^{\infty}u_n \sum_{n=1}^{\infty}u_n$. $l = \lim_{n\to\infty}\frac{u_{n+1}}{u_n}$. $l = \lim_{n\to\infty}\frac{u_{n+1}}{u_n}$. 6 . $\sum_{n=1}^{\infty}u_n$ $\sum_{n=1}^{\infty}u_n$ 3 1) $l = 0{,}1$ и $\lim_{n\to\infty} u_n = 1$; 2) $l = 1$ и $\lim_{n\to\infty} u_n = 0$; 3) $l = 2$ и $\lim_{n\to\infty} u_n$ бесконечен; 4) $l = 0$ и $\lim_{n\to\infty} u_n = 0$.	;
	6 $\sum_{n=1}^{\infty}\frac{(-1)^n}{3n^4-15} \sum_{n=1}^{\infty}\frac{(-1)^n}{3n^4-15}$. 1 (5 1 3; 1 3 1 ,6	;

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	$\sum_{n=1}^{\infty}\frac{(-1)^{n+1}}{n\cdot10^n}\sum_{n=1}^{\infty}\frac{(-1)^{n+1}}{n\cdot10^n}$ 3 3 =	
	5 0 $\sum_{n=1}^{\infty}\frac{(-1)^{n+1}n}{2^n}$ $\sum_{n=1}^{\infty}\frac{(-1)^{n+1}n}{2^n}$ $1)\, 0<S<\frac{1}{2};\quad 2)\,\frac{3}{8}<S<\frac{5}{8};\quad 3)\,\frac{1}{8}<S<\frac{3}{8};$ $4)\, 0<S<\frac{1}{8}.$	
3	$\iint xy\,dx\,dy \iint xy\,dx\,dy$3 . $4x^2+y^2\le 4 4x^2+y^2\le 4$	
	. $I=\int_1^3 dy\int_0^{2y} udx$ $I=\int_1^3 dy\int_0^{2y} udx$	$\int_0^2 dx\int_1^3 udy+\int_2^6 dx\int_{\frac{x}{2}}^3 udy$
	$I=\iint_D \rho\, sin\varphi\, d\rho\, d\varphi$ $I=\iint_D \rho\, sin\varphi\, d\rho\, d\varphi$3 . $\rho\le 2a\,cos\varphi, 0\le\varphi\le\frac{\pi}{2}\rho\le 2a\,cos\varphi, 0\le\varphi\le\frac{\pi}{2}$	$\frac{2}{3}a^2$
	. 3 $\rho=a\,cos\varphi,$ $\rho=a\,cos\varphi,$ $\rho=b\,cos\varphi$	$\frac{\pi}{4}(b^2-a^2)$
	3 1 . 1 $z=4-x^2-y^2, 2z=2+x^2+y^2$	$V=3\pi$
	. 3 - . 3 . 1 . . . . 0 . . 5	$m=\frac{4}{3}a^2b\lambda$
		$\frac{4\pi a^5}{\sqrt{3}}$

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	$J = \iiint_W (x^2+y^2+z^2)dxdydzJ = \iiint_W (x^2+y^2+z^2)dxdydz$ 3 . 1 $3(x^2+y^2)+z^2 = 3a^2$	
	3 . 1 $x^2+y^2+z^2 = 2z, x^2+y^2 = z^2 x^2+y^2+z^2 = 2z, x^2+y^2 = z^2$	$V = \pi$
	0 3 . . . 0	$z_c = \frac{20R^2 - 15Rh + 3h}{5(4R-h)}$
	$I = \iiint_D (3x+4y)dxdydzI = \iiint_D (3x+4y)dxdydz$3 . $y = x, y = 0, y = x, y = 0,$ $x = 1, z = 5(x^2+y^2), z = 0$	7
	3 . 1 4 $x^2+y^2 = 1, x^2+y^2 = 2z, z = 0, x \geq 0, y \geq 0$ $x^2+y^2 = 1, x^2+y^2 = 2z, z = 0, x \geq 0, y \geq 0$3 - 4 0 . $\rho(x,y,z) = 10x\rho(x,y,z) = 10x$	$m = 1$
	. 3 4 . 1 $z = 1 - x^2 - y^2, x + y - 1 \leq 0, x \geq 0, y \geq 0,$ $z \geq 0$	$V = \frac{1}{3}$
	(C4B , (4; ,6 4 $I = \int_C xy^2dx + yz^2dy - zx^2dzI = \int_C xy^2dx + yz^2dy - zx^2dz$. 3 $x^2+y^2+z^2 = 45, 2x+y = 0x^2+y^2+z^2 = 45, 2x+y = 0$	$-173\frac{3}{4}$
	$\oint_{-l} 2xdx - (x+2y)dy$ $\oint_{-l} 2xdx - (x+2y)dy$. (45 ,3 (; ,3 (; ,	3
	3 . . .	$mg(z_B - z_A)$
	$\int_L xydl \int_L xydl$. 4	$-\frac{1}{2}$

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	$x(t) = cost, y(t) = sint$ $x(t) = cost, y(t) = sint$ 3 . . $\frac{\pi}{2} \le t \le \pi$ $\frac{\pi}{2} \le t \le \pi$	
	$\int_L x^2ydy - y^2xdx$ $\int_L x^2ydy - y^2xdx$. $x = \sqrt{cost}, x = \sqrt{cost},$ $y = \sqrt{sint} y = \sqrt{sint}$ 3 $0 \le t \le \frac{\pi}{2}$ $0 \le t \le \frac{\pi}{2}$	$\frac{\pi}{4}$
	$\oint_C (2x + y)dx + 3xdy$ $\oint_C (2x + y)dx + 3xdy$. 3 $y = x^2, y = 4, y = x^2, y = 4,$ $x = 0 x = 0$.	$\frac{32}{3}$

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$\lim_{n \to \infty} \frac{(2n+1)^2-(n+1)^2}{n^2+n+1}$ $\lim_{n \to \infty} \frac{(2n+1)^2-(n+1)^2}{n^2+n+1}$

$$\lim_{n\to\infty} \frac{(2n+1)^2 - (n+1)^2}{n^2+n+1} = \lim_{n\to\infty} \frac{4n^2+4n+1-n^2-2n-1}{n^2+n+1} =$$

$$= \lim_{n\to\infty} \frac{3n^2+2}{n^2+n+1} = \lim_{n\to\infty} \frac{3+\frac{2}{n}}{1+\frac{1}{n}+\frac{1}{n^2}} = \frac{3}{1} = 3$$

. $\lim_{n \to \infty} \left(\frac{2+4+\cdots+2n}{n+3} - n\right)$

$\lim_{n \to \infty} \left(\frac{2+4+\cdots+2n}{n+3} - n\right)$

- . $s_n = \frac{2a_1+d(n-1)}{2} \cdot n$ $s_n = \frac{2a_1+d(n-1)}{2} \cdot n$

$$s_n = \frac{a_1 + a_n}{2} \cdot n$$

$$1 + 2 + \cdots + n = \frac{1+n}{2} \cdot n$$

$$\lim_{n\to\infty} \frac{n^2+n-n^2-3n}{n+3} = \lim_{n\to\infty} \frac{-2n}{n+3} = \lim_{n\to\infty} \frac{-2}{1+\frac{3}{n}} = -2$$

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. $\lim_{n\to\infty}\left(\frac{4n^2+4n-1}{4n^2+2n+3}\right)^{1-2n}$

$\lim_{n\to\infty}\left(\frac{4n^2+4n-1}{4n^2+2n+3}\right)^{1-2n}$

. $\lim\limits_{n\to\infty}\left(1+\frac{1}{x}\right)^x=e$

$\lim\limits_{n\to\infty}\left(1+\frac{1}{x}\right)^x=e$

$$\lim_{n\to\infty}\left(\frac{4n^2+4n-1}{4n^2+2n+3}\right)^{1-2n}=\lim_{n\to\infty}\left(\frac{4n^2+2n+3+2n-4}{4n^2+2n+3}\right)^{1-2n}=$$

$$=\left[\lim_{n\to\infty}\left(1+\frac{2n-4}{4n^2+2n+3}\right)^{\frac{4n^2+2n+3}{2n-4}}\right]^{\frac{(2n-4)(1-2n)}{4n^2+2n+3}}=$$

$$=e^{\lim\limits_{n\to\infty}\frac{(2n-4)(1-2n)}{4n^2+2n+3}}=e^{\lim\limits_{n\to\infty}\frac{-4n^2+10n-4}{4n^2+2n+3}}=e^{\lim\limits_{n\to\infty}\frac{-4+\frac{10}{n}-\frac{4}{n^2}}{4+\frac{2}{n}+\frac{3}{n^2}}}=e^{-1}=\frac{1}{e}$$

. $\lim_{x\to3}\frac{\sqrt{x+13}-2\sqrt{x+1}}{\sqrt[3]{x^2-9}}$ $\lim_{x\to3}\frac{\sqrt{x+13}-2\sqrt{x+1}}{\sqrt[3]{x^2-9}}$

$$\lim_{x\to3}\frac{\sqrt{x+13}-2\sqrt{x+1}}{\sqrt[3]{x^2-9}}=\left[\frac{\sqrt{16}-2\sqrt{4}}{\sqrt[3]{9-9}}=\frac{0}{0}\right]=$$

$$=\lim_{x\to3}\frac{\left(\sqrt{x+13}-2\sqrt{x+1}\right)\left(\sqrt{x+13}+2\sqrt{x+1}\right)}{\sqrt[3]{x^2-9}\left(\sqrt{x+13}+2\sqrt{x+1}\right)}=$$

$$=\lim_{x\to3}\frac{x+13-4x-4}{\sqrt[3]{(x-3)(x+3)}\left(\sqrt{x+13}+2\sqrt{x+1}\right)}=$$

$$=\lim_{x\to3}\frac{-3x+9}{\sqrt[3]{(x-3)(x+3)}\left(\sqrt{x+13}+2\sqrt{x+1}\right)}=$$

$$=\lim_{x\to3}\frac{-3(x-3)^{\frac{2}{3}}}{\sqrt[3]{x+3}\left(\sqrt{x+13}+2\sqrt{x+1}\right)}=\frac{-3\cdot0}{\sqrt[3]{6}\left(\sqrt{16}+2\sqrt{4}\right)}=\frac{0}{\sqrt[3]{6}\cdot8}=0$$

. $\lim_{x\to0}\frac{x\cdot\sin2x}{1+\cos(x-3\pi)}$ $\lim_{x\to0}\frac{x\cdot\sin2x}{1+\cos(x-3\pi)}$

$$\lim_{x\to0}\frac{x\cdot\sin2x}{1+\cos(x-3\pi)}=\left[\frac{0}{1-1}=\frac{0}{0}\right]=\lim_{x\to0}\frac{x\cdot\sin2x}{1-\cos x}=$$

$$= \lim_{x\to 0}\frac{x\cdot 2\sin x\cos x}{2\sin^2\frac{x}{2}} = \begin{bmatrix}\text{при } x\to 0 \ \sin x \sim x\\ \text{эквивалентные функции}\end{bmatrix} =$$

$$= \lim_{x\to 0}\frac{x\cdot x\cdot \cos x}{\frac{x^2}{2}} = \frac{\cos 0}{\frac{1}{2}} = 2\cdot 1 = 2$$

6 . $\lim_{x\to\pi}\frac{\cos 3x-\cos x}{\operatorname{tg}^2 2x}\lim_{x\to\pi}\frac{\cos 3x-\cos x}{\operatorname{tg}^2 2x}$

$$\lim_{x\to\pi}\frac{\cos 3x-\cos x}{\operatorname{tg}^2 2x} = \begin{bmatrix}0\\ \hline 0\end{bmatrix} = -\lim_{x\to\pi}\frac{(2\sin 2x\cdot\sin x)\cdot\cos^2 2x}{\sin^2 2x} =$$

$$= -2\lim_{x\to\pi}\frac{\sin x\cdot\cos^2 2x}{\sin 2x} = -2\lim_{x\to\pi}\frac{\sin x\cos^2 2x}{2\sin x\cos x} =$$

$$= -\lim_{x\to\pi}\frac{\cos^2 2x}{\cos x} = -1\cdot\frac{1}{-1} = 1$$

6 . - $y = \frac{2(3x^3+4x^2-x-2)}{15\sqrt{1+x}}$

$y = \frac{2(3x^3+4x^2-x-2)}{15\sqrt{1+x}}$

$$y' = \frac{2}{15}\left[\frac{(3x^3+4x^2-x-2)'\cdot\sqrt{1+x}}{1+x} - \frac{(3x^3+4x^2-x-2)\left(\sqrt{1+x}\right)'}{1+x}\right] =$$

$$= \frac{2}{15}\left[\frac{(9x^2+8x-1)\sqrt{1+x}-\frac{3x^3+4x^2-x-2}{2\sqrt{1+x}}}{1+x}\right] =$$

$$= \frac{2}{15}\left[\frac{2(9x^2+8x-1)(1+x)-3x^3-4x^2+x+2}{2\sqrt{1+x}(1+x)}\right] =$$

$$= \frac{1}{15}\left[\frac{18x^2+18x^3+16x+16x^2-2-2x-3x^3-4x^2+x+2}{\sqrt{1+x}(1+x)}\right] =$$

$$= \frac{1}{15}\cdot\frac{15x^3+30x^2+15x}{\sqrt{1+x}(1+x)} = \frac{x^3+2x^2+x}{\sqrt{1+x}(1+x)} = \frac{x(1+x)^2}{\sqrt{1+x}(1+x)} = x\sqrt{1+x}$$

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. . - 0 $y = \sin\sqrt{3} + \frac{1}{3}\cdot\frac{\sin^2 3x}{3\cos 6x}$

$$y = \sin\sqrt{3} + \frac{1}{3}\cdot\frac{\sin^2 3x}{3\cos 6x}$$

$$y' = \frac{1}{9}\cdot\frac{(\sin^2 3x)'\cdot\cos 6x - \sin^2 3x\cdot(\cos 6x)'}{\cos^2 6x} =$$

$$= \frac{1}{9}\cdot\frac{2\sin 3x\cdot\cos 3x\cdot 3\cdot\cos 6x + 6\sin^2 3x\cdot 6\cdot\sin 6x}{\cos^2 6x} =$$

$$= \frac{1}{9}\cdot\frac{3\cdot\sin 6x\cdot\cos 6x + 6\cdot\sin^2 3x\cdot\sin 6x}{\cos^2 6x} =$$

$$= \left[\sin^2 3x = \frac{1-\cos 6x}{2}\right] = \frac{1}{3}\cdot\frac{\sin 6x\,(\cos 6x + 1 - \cos 6x)}{\cos^2 6x} =$$

$$= \frac{1}{3}\operatorname{tg} 6x\cdot\sec 6x$$

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0

$$y = \frac{4x - x^2}{4}, x_0 = 2$$

$$y - y_0 = f'(x_0)\cdot(x - x_0) y - y_0 = f'(x_0)\cdot(x - x_0)$$

$$y_0 = y(x_0) = y(2) = \frac{4\cdot 2 - 2^2}{4} = \frac{8-4}{4} = 1$$

$$y' = \frac{1}{4}(4x - x^2)' = \frac{1}{4}(4 - 2x) = \frac{2-x}{2}$$

$$y'(x_0) = y'(2) = 0$$

$$y - 1 = 0\cdot(x - 2)$$

$$y = 1 y = 1$$

$$y - y_0 = -\frac{1}{f'(x_0)}(x - x_0) y - y_0 = -\frac{1}{f'(x_0)}(x - x_0)$$

$$y - 1 = -\frac{x-2}{0}$$

$$x - 2 = 0$$

$$x = 2 x = 2$$

- - 0 - 0

$$y = x\cdot\arcsin\frac{1}{x} + \ln\left|x + \sqrt{x^2 - 1}\right|, x > 0 y = x\cdot\arcsin\frac{1}{x} + \ln\left|x + \sqrt{x^2 - 1}\right|, x > 0$$

$$y' = x' \cdot \arcsin\frac{1}{x} + x\left(\arcsin\frac{1}{x}\right)' + \frac{\left|x+\sqrt{x^2-1}\right|'}{\left|x+\sqrt{x^2-1}\right|} =$$

$$= \arcsin\frac{1}{x} + x \cdot \frac{\left(-\frac{1}{x^2}\right)}{\sqrt{1-\frac{1}{x^2}}} + \frac{\left|1+\frac{2}{2\sqrt{x^2-1}}\right|}{\left|x+\sqrt{x^2-1}\right|} =$$

$$= \arcsin\frac{1}{x} - \frac{x^2}{\sqrt{x^2-1}\cdot x^2} + \frac{\left|\sqrt{x^2-1}+x\right|}{\left|x+\sqrt{x^2-1}\right|\cdot\sqrt{x^2-1}} = \arcsin\frac{1}{x}$$

$$dy = \arcsin\frac{1}{x}\cdot dx$$

- $y = 16x^3 + 12x^2 - 5$

$y = 16x^3 + 12x^2 - 5$

. - $D(y) = RD(y) = R$

$y' = 48x^2 + 24x$

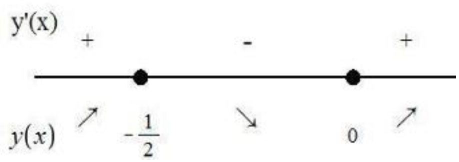
$D(y) = RD(y) = R$ 1

$y' = 0$

$48x^2 + 24x = 0$

$24x(2x+1) = 0$

$x = 0$ или $x = -\frac{1}{2}$ – стационарные точки



$x_{max} = -\frac{1}{2}$

$x_{min} = 0$

$$y_{max} = 16\cdot\left(-\frac{1}{2}\right)^3 + 12\cdot\left(-\frac{1}{2}\right)^2 - 5 = -\frac{16}{8} + \frac{12}{4} - 5 = -2 + 3 - 5 =$$
$$= -4$$

-

$$y = \frac{10x+10}{x^2+2x+2} \text{ при } x \in [-1;2]$$

$$y(-1) = \frac{-10+10}{1-2+2} = 0$$

$$y(2) = \frac{20+10}{4+4+2} = \frac{30}{10} = 3$$

$$y' = \frac{(10x+10)'(x^2+2x+2) - (10x+10)(x^2+2x+2)'}{(x^2+2x+2)^2} =$$
$$= \frac{10(x^2+2x+2) - (10x+10)(2x+2)}{(x^2+2x+2)^2} =$$
$$= \frac{10x^2+20x+20-20x^2-20x-20x-20}{(x^2+2x+2)^2} = \frac{-10x^2-20x}{(x^2+20+2)^2} =$$
$$= -\frac{10x(x+2)}{(x^2+2x+2)^2}$$

$y' = 0$ при $x = 0; x = -2; 0 \in [-1; 2]$

$$y(0) = \frac{10}{2} = 5$$

$y_{\text{наибольшее}} = 5; y_{\text{наименьшее}} = 0$

5 6 - . - $y = \frac{x^3-4}{x^2} y = \frac{x^3-4}{x^2}$

5, . $D(y) = (-\infty; 0) \cup (0; +\infty)$

$D(y) = (-\infty; 0) \cup (0; +\infty)$

; , $y(-x) \neq y(x) y(-x) \neq y(x)$

$y(-x) \neq -y(x)$

, .

,

$y = 0$ при $x = \sqrt[3]{4}$ – координаты пересечения графика с осью OX

$y = 0$ при $x = \sqrt[3]{4}$ – координаты пересечения графика с осью OX

$x \neq 0 x \neq 0$ *1* .

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$$y' = \frac{(x^3-4)' \cdot x^2 - (x^3-4) \cdot (x^2)'}{x^4} = \frac{3x^2 \cdot x^2 - (x^3-4) \cdot 2x}{x^4} =$$
$$= \frac{3x^4 - 2x^2 + 8x}{x^4} = \frac{x^4+8x}{x^4} = \frac{x^3+8}{x^3}$$

$y'y'$ . . $x = 0 x = 0$3 $x = 0 x = 0$ 1 . 4

$y(x)y(x)$3 3 1 6

$y' = 0 y' = 0$. $x^3 + 8 = 0 x^3 + 8 = 0$3 3 $x = -2 x = -2$ 4

6

$x_{max} = -2 x_{max} = -2$

$$y_{max} = \frac{(-2)^3 - 4}{(-2)^2} = \frac{-8-4}{4} = -3$$ – максимум функции

2 $x \in (-\infty; -2] x \in (-\infty; -2]$ - . $x \in [-2; 0) x \in [-2; 0)$

- 3. $x \in (0; +\infty) x \in (0; +\infty)$ - 6

, 2 - .

$$y'' = \frac{(x^3+8)' \cdot x^3 - (x^3+8) \cdot 3x^2}{x^6} = \frac{3x^2 \cdot x^3 - 3x^5 - 24x^2}{x^6} =$$

$$= -\frac{24x^2}{x^6} = -\frac{24}{x^4}$$

$y'' < 0 y'' < 0$ - . 1

$y'' \neq 0 y'' \neq 0$ . .

, .

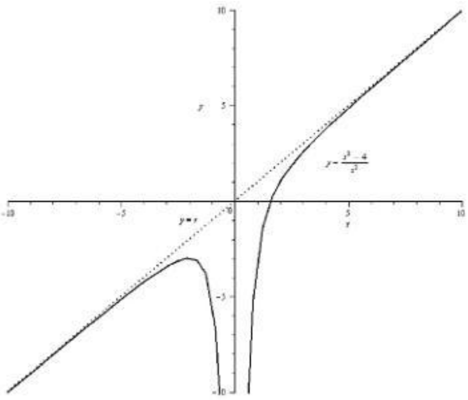
Так как $\lim\limits_{x \to +0} \frac{x^3 - 4}{x^3} = -\infty$, то $x = 0$ – вертикальная асимптота

$y = kx + b y = kx + b$.

$$k = \lim_{x \to \pm\infty} \frac{x^3 - 4}{x \cdot x^2} = \lim_{x \to \pm\infty} \left(1 - \frac{4}{x^3}\right) = 1$$

$$b = \lim_{x \to \pm\infty} \left(\frac{x^3 - 4}{x^2} - x\right) = \lim_{x \to \pm\infty} \frac{x^3 - 4 - x^3}{x^2} = \lim_{x \to \pm\infty} \left(-\frac{4}{x^2}\right) = 0$$

$y = x y = x$.



C

$$\int \frac{x \cdot \cos x\, dx}{\sin^3 x} \int \frac{x \cdot \cos x\, dx}{\sin^3 x}$$

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$$\int \frac{x \cdot \cos x\, dx}{\sin^3 x} = \left[\begin{array}{ll} u = x & dv = \frac{\cos x}{\sin^3 x} dx \\ du = dx & v = \int \frac{\cos x}{\sin^3 x} dx = \int \sin^{-3} x\, d(\sin x) = \\ & = \frac{\sin^{-2} x}{-2} = -\frac{1}{2\sin^2 x} \end{array} \right] =$$

$$= -\frac{x}{2\sin^2 x} + \int \frac{dx}{2\sin^2 x} = -\frac{x}{2\sin^2 x} - \frac{1}{2} \operatorname{ctg} x + C$$

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$d(\sin x) = cosxdxd(\sin x) = cosxdx$

. $\int_{-2}^{0}(x^2+2)e^{\frac{x}{2}}dx$

$\int_{-2}^{0}(x^2+2)e^{\frac{x}{2}}dx$

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$\int_a^b f(x)dx = F(b) - F(a).\int_a^b f(x)dx = F(b) - F(a).$

$$\int_{-2}^{0}(x^2+2)e^{\frac{x}{2}}dx = \begin{bmatrix} u = x^2+2 & dv = e^{\frac{x}{2}}dx \\ & v = \int e^{\frac{x}{2}}dx = \\ du = 2xdx & \\ & = 2\cdot\int e^{\frac{x}{2}}d\left(\frac{x}{2}\right) = 2e^{\frac{x}{2}} \end{bmatrix} =$$

$$= 2e^{\frac{x}{2}}(x^2+2)\Big|_{-2}^{0} - 2\int_{-2}^{0} e^{\frac{x}{2}}\cdot 2xdx = 2e^0\cdot -2e^{-1}\cdot 6 - 4\cdot\int_{-2}^{0} xe^{\frac{x}{2}}dx =$$

$$= \begin{bmatrix} u = x & dv = e^{\frac{x}{2}}dx \\ du = dx & v = 2e^{\frac{x}{2}} \end{bmatrix} = 4 - \frac{12}{e} - 4\cdot(2x\,e^{\frac{x}{2}}\Big|_{-2}^{0} - 2\int_{-2}^{0} e^{\frac{x}{2}}dx =$$

$$= 4 - \frac{12}{e} - 4(0 — 4\cdot e^{-1} - 4\,e^{\frac{x}{2}}\Big|_{-2}^{0} = 4 - \frac{12}{e} - \frac{16}{e} + 16(e^0 - e^{-1}) =$$

$$= 4 - \frac{28}{e} + 16 - \frac{16}{e} = 20 - \frac{44}{e}$$

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$d\left(\frac{x}{2}\right) = \frac{1}{2}dx, d\left(\frac{x}{2}\right) = \frac{1}{2}dx,$ - /

$\int\frac{1-\sqrt{x}}{\sqrt{x}(x+1)}dx \int\frac{1-\sqrt{x}}{\sqrt{x}(x+1)}dx$

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$\sqrt{x} = t\sqrt{x} = t$ 2 - - 0 / - - 0

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$$\int\frac{1-\sqrt{x}}{\sqrt{x}(x+1)}dx = \begin{bmatrix} \sqrt{x} = t & dx = 2\sqrt{x}dt = \\ \frac{dx}{2\sqrt{x}} = dt & = 2tdt \end{bmatrix} = \int\frac{(1-t)2tdt}{t(t^2+1)} =$$

$$= 2\int\frac{(1-t)dt}{t^2+1} = 2\int\frac{dt}{t^2+1} - 2\int\frac{tdt}{t^2+1} = 2\text{arctg}\,t -$$

$$-2\cdot\frac{1}{2}\int\frac{t^2+1}{t^2+1} = 2\text{arctg}\,t - \ln(t^2+1) = 2\text{arctg}\,\sqrt{x} - \ln(x+1) + C$$

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/ . / - 0 $t^2+1t^2+1.$

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- - $d(t^2+1)=2tdt$ $d(t^2+1)=2tdt$

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$x=4-(y-1)^2$ $x=4-(y-1)^2$ $x=y^2-4y+3$ $x=y^2-4y+3$

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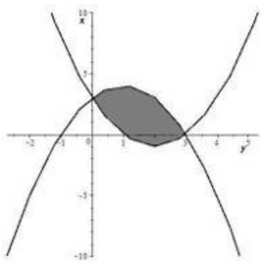
$4-(y-1)^2=y^2-4y+3$

$4-y^2+2y-1=y^2-4y+3$

$2y^2-6y=0$

$2y(y-3)=0$

$y=0, y=3$ $y=0, y=3$. $y\in[0;3]$ $y\in[0;3]$



/ . - / $S=\int_a^b[f_1(y)-f_2(y)]dy$ $S=\int_a^b[f_1(y)-f_2(y)]dy$

$f_1(y)>f_2(y)$ $f_1(y)>f_2(y)$ $[a;b]$ $[a;b]$

$$S=\int_0^3[4-(y-1)^2-y^2+4y-3]dy=\int_0^3(-2y^2+6y)dy=$$

$$=-\frac{2y^3}{3}+\frac{6y^2}{2}=\left(-\frac{2y^3}{3}+3y^2\right)\Bigg|_0^3=-\frac{2\cdot 27}{3}+3\cdot 9=-18+27=9$$

$y=\frac{1-e^x-e^{-x}}{2}, 0\le x\le 3$ $y=\frac{1-e^x-e^{-x}}{2}, 0\le x\le 3$

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$$L=\int_\alpha^\beta\sqrt{1+\left(f'(x)\right)^2}dx$$

/ . $f'(x)$ $f'(x)$ /

$$f'(x)=y'=\frac{-e^x+e^{-x}}{2}$$

$$(y')^2=\frac{e^{-2x}-2e^{-x}\cdot e^x+e^{2x}}{4}=\frac{e^{2x}+e^{-2x}+2}{4}$$

/ . / .

$$1+\frac{e^{2x}+e^{-2x}-2}{4}=\frac{e^{2x}+2+e^{-2x}}{4}=\frac{(e^{x}+e^{-x})^2}{4}$$

$$L=\int_0^3\frac{e^{x}+e^{-x}}{2}dx=\frac{1}{2}(e^{x}-e^{-x})\Big|_0^3=\frac{1}{2}[(e^3-e^{-3})-(e^0-e^0)]=$$

$$=\frac{e^3-e^{-3}}{2}$$

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

2

$$z=\frac{\cos x^2}{x+y}z=\frac{\cos x^2}{x+y}$$

$$z'_x=\frac{(\cos x^2)'_x\cdot(x+y)-\cos x^2\cdot(x+y)'_x}{(x+y)^2}=$$

$$=\frac{-2x\cdot\sin x^2\cdot(x+y)-\cos x^2}{(x+y)^2}$$

$$z'_y=\cos x^2\cdot\left(\frac{1}{x+y}\right)'_y=-\frac{\cos x^2}{(x+y)^2}$$

$$z=\frac{4y}{\sqrt{y^2-x}},\text{где } x=t\cdot\cos t\,,y=t\cdot\sin t$$

$$\frac{dz}{dt}=\left(\frac{4y}{\sqrt{y^2-x}}\right)'_x\cdot\frac{dx}{dt}+\left(\frac{4y}{\sqrt{y^2-x}}\right)'_y\cdot\frac{dy}{dt}$$

$$\left(\frac{4y}{\sqrt{y^2-x}}\right)'_x=4y\cdot\left((y^2-x)^{-\frac{1}{2}}\right)'_x=4y\cdot\left(-\frac{1}{2}\right)\cdot(y^2-x)^{-\frac{3}{2}}\cdot$$

$$\cdot(y^2-x)'_x=\frac{2y}{(y^2-x)^{\frac{3}{2}}}=\frac{2y}{\sqrt{(y^2-x)^3}}$$

$$\left(\frac{4y}{\sqrt{y^2-x}}\right)'_y=\frac{4\cdot\sqrt{y^2-x}-4y\cdot\frac{2y}{2\sqrt{y^2-x}}}{y^2-x}=\frac{4(y^2-x)-4y^2}{\sqrt{(y^2-x)^3}}=$$

$$=-\frac{4x}{\sqrt{(y^2-x)^3}}$$

$$\frac{dx}{dt}=\cos t-t\cdot\sin t$$

$$\frac{dy}{dt}=\sin t-t\cdot\cos t$$

$$\frac{dz}{dt}=\frac{2y}{\sqrt{(y^2-x)^3}}\cdot(\cos t-t\cdot\sin t)-\frac{4x}{\sqrt{(y^2-x)^3}}\cdot(\sin t-t\cdot\cos t)=$$

$$= \frac{2}{\sqrt{(y^2 - x)^3}} \cdot (y\cos t - yt\sin t - 2x\sin t + 2xt\cos t) =$$
$$= \frac{2}{\sqrt{(y^2 - x)^3}} \cdot \big((y + 2xt)\cdot\cos t - (yt + 2x)\cdot\sin t\big)$$

. - $tg^3 z + \sin x + \cos y - e^x = 0$

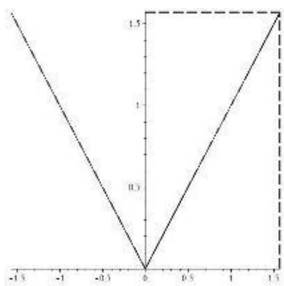
$tg^3 z + \sin x + \cos y - e^x = 0$

$$\frac{3tg^2 z}{\cos^2 z}\cdot z'_x + \cos x - e^x = 0$$
$$z'_x = \frac{(e^x - \cos x)\cdot\cos^2 z}{3tg^2 z}$$
$$\frac{3tg^2 z}{\cos^2 z}\cdot z'_y - \sin y = 0$$
$$z'_y = \frac{\sin y\cdot\cos^2 z}{3tg^2 z}$$

- $z = \sin x + \sin y + \sin(x + y)$

$z = \sin x + \sin y + \sin(x + y)$

. $0 \le x \le \frac{\pi}{2} 0 \le x \le \frac{\pi}{2}$ $0 \le y \le \frac{\pi}{2} 0 \le y \le \frac{\pi}{2}$



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$$\begin{cases} z'_x = \cos x + \cos(x + y) \\ z'_y = \cos y + \cos(x + y) \end{cases}$$

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$\cos y - \cos x = 0$

$\cos x = \cos y$

$$\left[\begin{array}{l} y = x \\ y = -x - \text{не принадлежит области} \end{array}\right.$$

$y = xy = x$.

$$\cos x + \cos 2x = 0$$
$$2\cos^2 x + \cos x - 1 = 0$$
$$D = 1 + 8 = 3^2$$
$$\cos x = -\frac{1 \pm 3}{4};\ \left[\begin{array}{l}\cos x = -1\\ \cos x = \frac{1}{2}\end{array}\right.$$
$$\left[\begin{array}{l}x = \pi + 2\pi n - \text{не принадлежит области}\\ x = \pm\frac{\pi}{3} + 2\pi n - \text{указанной области принадлежит } x = \frac{\pi}{3}\end{array}\right.$$

. $\left(\frac{\pi}{3};\frac{\pi}{3}\right)\left(\frac{\pi}{3};\frac{\pi}{3}\right)$

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$$z(0,0) = 0$$
$$z\left(0;\frac{\pi}{2}\right) = 2$$
$$z\left(\frac{\pi}{2};0\right) = 2$$
$$z\left(\frac{\pi}{2};\frac{\pi}{2}\right) = 2$$
$$z\left(\frac{\pi}{3};\frac{\pi}{3}\right) = \frac{\sqrt{3}}{2} + \frac{\sqrt{3}}{2} + \frac{\sqrt{3}}{2} = \frac{3\sqrt{3}}{2} \approx 2.6$$

$$z_{\text{наиб}} = \frac{3\sqrt{3}}{2}$$
$$z_{\text{наим}} = 0$$

$\iint xy\,dx\,dy \iint xy\,dx\,dy$3 . 4

4 . $y^2 = 2x y^2 = 2x$

. $I = \int_{-\sqrt{x}}^{1} dx \int_{-\sqrt{4-x^2}}^{0} v\,dy$

$$I = \int_{-\sqrt{x}}^{1} dx \int_{-\sqrt{4-x^2}}^{0} v\,dy$$

$$\int_{-2}^{-\sqrt{3}} dy \int_{-\sqrt{4-y^2}}^{\sqrt{4-y^2}} v\,dx + + \int_{-\sqrt{3}}^{-1} dy \int_{-\sqrt{4-y^2}}^{1} v\,dx + + \int_{-1}^{0} dy \int_{-\sqrt{3}}^{1} v\,dx$$

$I = \iint_D \rho\, sin\varphi\ d\rho\ d\varphi I = \iint_D \rho\, sin\varphi\ d\rho\ d\varphi$3

3 $\rho = a, \varphi = \frac{\pi}{2}, \varphi = \pi \rho = a, \varphi = \frac{\pi}{2}, \varphi = \pi$

H $\frac{a^2}{2}$ $\frac{a^2}{2}$

6 . E 3 H $y^2 = x^3, y^2 = 8(6-x)^3$
$y^2 = x^3, y^2 = 8(6-x)^3$

H $38\frac{2}{4}$ $38\frac{2}{4}$

6 3 1 . 1 H
$y = x^2, y = 1, x + y + z = 4, z = 0$

H $V = \frac{68}{15}$ $V = \frac{68}{15}$

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H $x_c = 0, y_c = \frac{a}{2}$ $x_c = 0, y_c = \frac{a}{2}$

6
$K = \iiint_T y\,dx\,dy\,dz$ $K = \iiint_T y\,dx\,dy\,dz$ 3 . 1
$y = \sqrt{x^2 + y^2}$ u $y = h, h > 0$ $y = \sqrt{x^2 + y^2}$ u $y = h, h > 0$

H $\frac{\pi h^4}{4}$ $\frac{\pi h^4}{4}$

6 3 . 1 H
$x + y + z = 4, x = 3,$
$y = 2, x = 0, y = 0, z = 0$

H $V = \frac{55}{6}$ $V = \frac{55}{6}$

6 3 0 . 1 $x^2 = 2y$ $x^2 = 2y$
. $y + z = 1,\ 2y + z = 2$ $y + z = 1,\ 2y + z = 2$ 3 4
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H $m = \frac{8\sqrt{2}}{35}$ $m = \frac{8\sqrt{2}}{35}$

5 6 $I = \iiint_D 8y^2 z e^{2xyz}\,dx\,dy\,dz$ $I = \iiint_D 8y^2 z e^{2xyz}\,dx\,dy\,dz$ 3
. H $x = -1, x = 0,$ $x = -1, x = 0,$
$y = 0, y = 2, z = 0, z = 1$ $y = 0, y = 2, z = 0, z = 1$

H $5 - e^{-4}$ $5 - e^{-4}$

556 3 . 1 H
$z = x^2 + y^2, z^2 = x^2 + y^2, y \geq 0$ $z = x^2 + y^2, z^2 = x^2 + y^2, y \geq 0$ 3 - 0
. $\rho(x,y,z) = 70yz$ $\rho(x,y,z) = 70yz$

H $m = 4$ $m = 4$

5; 6 . E 3 . 1 H
$z = x^2 + y^2, z^2 = x^2 + y^2$

H $V = \frac{\pi}{6}$ $V = \frac{\pi}{6}$

5 6
$I = \int_L (4\sqrt[3]{x} - e\sqrt{y})\,dl$ $I = \int_L (4\sqrt[3]{x} - e\sqrt{y})\,dl$ 3 (45 , (5, . 4

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$x = cos^3 t, x = cos^3 t,$

$y = sin^3 t y = sin^3 t$6

$-\frac{46}{7} - \frac{46}{7}$

5 6 % (4B , (4; ,6 %

$I = \int_C xy^2dx + yz^2dy - zx^2dz I = \int_C xy^2dx + yz^2dy - zx^2dz$ . . " %

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5 6 %

$x = 2acost - acos2t, y = 2asint - asin2t x = 2acost - acos2t, y = 2asint - asin2t$6

$16a 16a$

5B6 % $\int_L (x-y)dx + xdy \int_L (x-y)dx + xdy$. 1

. 7 . $\frac{x^2}{8} + \frac{y^2}{4} = 1 \frac{x^2}{8} + \frac{y^2}{4} = 1$6 . % 6

$\frac{3\sqrt{3}-1}{3} \frac{3\sqrt{3}-1}{3}$

5 6 %

$\oint_C (x+y)dx + (x-y)dy \oint_C (x+y)dx + (x-y)dy$. % $x^2 + y^2 = 4 x^2 + y^2 = 4$

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5	. . $\lim\limits_{n\to\infty}\left(\frac{3n+1}{3n-1}\right)^{2n+3}$.	$\sqrt[3]{e^4}$
	. . $\lim\limits_{n\to\infty}\left(\frac{n+3}{n+5}\right)^{n+4}$.	e^{-2}
	. - 0 $\lim\limits_{x\to 3}\frac{\sqrt{x+13}-2\sqrt{x+1}}{x^2-9}$.	$-\frac{1}{16}$

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	. - 0 $\lim\limits_{x\to 1}\frac{x^2-2x+1}{x^3-x^2-x+1}$.	$\frac{1}{2}$
	. - 0 3 . . . 4 $\lim\limits_{x\to 1}\left(\frac{x}{x-1}-\frac{1}{\ln x}\right)$	$\frac{1}{2}$
	. - 0 3 . . . 4 $\lim\limits_{x\to 0}\frac{tgx-\sin x}{x-\sin x}$	
	. - 0 $y=arctg(tg\frac{x}{2}+1)$.	$\frac{sec^2\frac{x}{2}}{2\left(\left(tg\frac{x}{2}+1\right)^2+1\right)}$
	. - 0 $y=(x^2+1)^{\cos x}$.	$y\cdot\left(\frac{2xcosx}{x^2+1}-\ln(x^2+1)\,sinx\right)$
	. $y'_x\, y'_x$ - 0 3 . 4 $\begin{cases}x=e^t\cos t,\\ y=e^t\sin t.\end{cases}$	$\frac{e^t sint+e^t cost}{e^t cost-e^t sint}$
5	. . $y'_x,\ y''_{xx}$. - 0 $x=e^{2t},\quad y=e^{3t}$ 6	$\frac{3e^t}{2};\frac{3}{4e^t}$
55	2 3 - 0 $y=\frac{\sin x}{x}$ $xy'+y=\cos x$ 6	$\frac{2xy^3-14xy}{-3x^2y^2+7x^2+\frac{1}{\sqrt{1-y^2}}}$
5	$y'y'$ $\arcsin y=x^2y^3-7yx^2$	
5	$y'y'$ $x^2y^4+10=3x^4y^3+x^5-5$	$\frac{5x^4+12x^3y^3-2xy^4}{4x^2y^3-9x^4y^2}$
5	$y'y'$ $e^{yx}=\ln\left(x^2+y^2\right)$	$\frac{2x-y(x^2+y^2)e^{yx}}{x(x^2+y^2)e^{yx}-2y}$
5	. $y'y'$ 3 . - 4 - - 0 $y=(tgx)^{\ln x}$	$\frac{y(\ln(tgx)+xlnxcsc(x)\sec(x))}{x}$
5	- - 0 - 0 $y=arctg\frac{x^2-1}{x}$.	$dy=\frac{x^2+1}{x^4-x^2+1}dx$
5	0 $y=\frac{2x}{x^2+1},x_0=1$ 6 - - 4	$y=1$

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5	$y=\dfrac{2+\sqrt{x}}{2-\sqrt{x}}$ 0 1 6 4	$y_k=\dfrac{2x}{3}-11$ $y_n=-\dfrac{3x}{2}+\dfrac{17}{2}$

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5	. $\int(4x-2)\cos 2x dx.$	(45, (, (,
	. $\int\dfrac{1+\ln x}{x}dx.$	$\dfrac{lnx(lnx+2)}{2}+C$
C	$\int\dfrac{xdx}{\cos^2 x}.$	$xtgx+\ln(cosx)+C$
	. $\int\dfrac{dx}{x\sqrt{x^2+1}}.$	$-\dfrac{1}{\sqrt{2}}arctg\sqrt{\dfrac{2}{x^2-2}}+C$
=	. $\int x\sqrt{x-2}dx$ 6	$\frac{2}{15}\sqrt{(x-2)^3}\frac{2}{15}\sqrt{(x-2)^3}$(C ,
	$\int xe^{2x}dx$ 6	$\dfrac{1}{4}e^{2x}(2x-1)+C$
	$\int\dfrac{x^3}{x^2+1}dx.$	$\dfrac{1}{2}(x^2-\ln(x^2+1))+C$
	. $\int(4x+3)\sin 5x dx.$ 6	$\dfrac{1}{25}(4\sin(5x)-5(4x+3)\cos(5x))+C$
	. $\int(4-3x)e^{-3x}dx.$	$e^{-3x}(x-1)+C$
5	. $\int(7x-10)\sin 4x dx.$	$\dfrac{1}{16}(7sin(4x)+(40-28x)\cos(4x))+C$
55	. $\int\dfrac{3x^2-2}{x^3-x}dx.$	$\dfrac{1}{2}\ln(1-x^2)+2lnx+C$
5	. $\int(4x-3)e^{-2x}dx.$	$e^{-2x}\left(\dfrac{1}{2}-2x\right)+C$
5C	. $\int_0^{\sqrt{3}}\dfrac{arctgx+x}{1+x^2}dx.$	$\dfrac{\pi^2}{18}+ln2$
5	+ .	$(\pi-x)\pi$

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	$\int_0^{\pi}(x^2-3x+2)\sin x dx.$	
5	. $\int_{-2}^{0}(x+6)\cos 2x dx.$	$\frac{1}{4}(1+8sin4-cos4)$
5	$\int_3^6 \frac{x^2-9}{x^4}dx.$	$\frac{5}{72}$
5	. - 3 $y=\arccos x, y=0, x=0.$	5
5	. - 3 $y=(x-2)^3, y=4x-8.$	
5	. - 3 $y=\sqrt{x}$ $y=x^2$ 6	$\frac{1}{3}$
	. - 3 $y=4-x^2$ $y=x^2-2x$ 6	
5	. - 3 $y=2x-x^2+3, y=x^2-4x+3.$	
	. - 3 $x=(y-2)^3, x=4y-8.$	
	. - 3 $y=\sqrt{4-x^2}, y=0, x=0, x=1.$	$\frac{1}{6}(3\sqrt{3}+2\pi)$

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5	$\frac{sh2x}{x}-2.$ . . 1 - 0	. $shx=x+\frac{x^3}{3!}+\cdots+\frac{x^{2n+1}}{(2n+1)!}+\cdots$
	$\frac{7}{12+x-x^2}.$ . . 1 - 0	1 1 7 $\frac{1}{x+3}-\frac{1}{x-4}$ $\frac{1}{x+3}-\frac{1}{x-4}$ 6 2 6
	$2x\cos^2\left(\frac{x}{2}\right)-x$ . . 1 - 0	. . - . . 62 6

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	$\ln\left(1-x-6x^2\right)$ . . 1 - 0	. - 0 (54 , (5 ,6 2 4 6
	$\frac{x^2}{\sqrt{4-5x}}$. . . 1 - 0	. $2(1-\frac{5x}{4})^{\frac{1}{2}}2(1-\frac{5x}{4})^{\frac{1}{2}}6$ 2 6
	$\frac{9}{20-x-x^2}$. . . 1 - 0	7 4 1 1 $\frac{1}{x+5}-\frac{1}{x-4}$ $\frac{1}{x+5}-\frac{1}{x-4}$6 2 6
	. 3 $y=2x, y=2^{-2x}, y=4 y=2x, y=2^{-2x}, y=4$	$\approx 5{,}507$
	3 . 14 $2z=x^2+y^2, y+z=4$ $2z=x^2+y^2, y+z=4$	$V=\frac{81}{4}\pi$
	+ $I=\iiint_D 15(y^2+z^2)dxdydz$ $I=\iiint_D 15(y^2+z^2)dxdydz$ 3 4 . $z=x+y, z=x+y,$ $x+y=1, x=0, y=0, z=0$	
5	+ 3 1 . 1 4 $z=y^2-x^2, z=0, y=\pm 2$ $z=y^2-x^2, z=0, y=\pm 2$	$V=\frac{32}{3}$
55	+ $\oint_C (x+y)dx+(x-y)dy \oint_C (x+y)dx+(x-y)dy$. $x^2+y^2=4 x^2+y^2=4$	
5	+ $I=\iiint_G \frac{dx\,dy\,dz}{(x+y+z+1)^3}$ $I=\iiint_G \frac{dx\,dy\,dz}{(x+y+z+1)^3}$ 3 . 4 $x+z=3, y=2, x=0, y=0, z=0$ $x+z=3, y=2, x=0, y=0, z=0$	$\frac{4\ln 2-1}{8}$
5	+ $I=\iint_D \rho\, sin\varphi\, d\rho\, d\varphi$ $I=\iint_D \rho\, sin\varphi\, d\rho\, d\varphi$3	

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	$\rho = 2 + cos\varphi \ u \ \rho = 1$ $\rho = 2 + cos\varphi \ u \ \rho = 1$	
5	$\int_L \frac{y-1}{x} dx + \frac{x+1}{y} dy \int_L \frac{y-1}{x} dx + \frac{x+1}{y} dy$ 3 4 . (5 5, (; ,	$\frac{6 - \ln 3}{2}$
5	$I = \int_L (4\sqrt[5]{x} - e\sqrt{y}) dl I = \int_L (4\sqrt[5]{x} - e\sqrt{y}) dl$ 3 (45 , (5, . .	$-5\sqrt{2}$
5B	. E 3 . 1 H $z = y^2, y = 1 - x, x = 0, y = 0, z = 0$ $z = y^2, y = 1 - x, x = 0, y = 0, z = 0$	$V = \frac{1}{12}$
5	0 3 4 . 1 H $x + y + z = a \ (a > 0), x = 0, y = 0, z = 0$ $x + y + z = a \ (a > 0), x = 0, y = 0, z = 0$	$x_0 = \frac{a}{4}, y_0 = \frac{a}{4}, z_0 = \frac{a}{4}$
5	0 $f(x) = \cos ax$ $(-\pi;\pi)$	$\frac{2\sin(a\pi)}{\pi}\left(\frac{1}{2a} + \sum_1^{\infty} \frac{a\cos(nx)}{a^2 - n^2}\right)$
5	0 $f(x) = \frac{\pi}{4}$. 1 $(0;\pi)$ 6 2 4 . $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \dots$	$\sum_{n=1}^{\infty} \frac{\sin(2a-1)x}{2n-1}$ $\frac{\pi}{4}$
;	$(0;\pi)$. 1 $f(x) = \begin{cases} x, & 0 < x \le \frac{\pi}{2}, \\ 0, & \frac{\pi}{2} < x < \pi. \end{cases}$	$\sum_{n=1}^{\infty} b_n \sin(nx), \sum_{n=1}^{\infty} b_n \sin(nx)$, $b_{2k} = (-1)^{k-1}\frac{1}{2k} b_{2k} = (-1)^{k-1}\frac{1}{2k}$ $b_{2k+1} = (-1)^k \frac{2}{\pi(2k+1)^2}$
; 5	0 $f(x) = x^2$ 4 $(-\pi;\pi)$	$x^2 = \frac{\pi^2}{3} - 4\sum_{n=1}^{\infty} (-1)^{n-1} \frac{\cos(nx)}{n^2}$

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