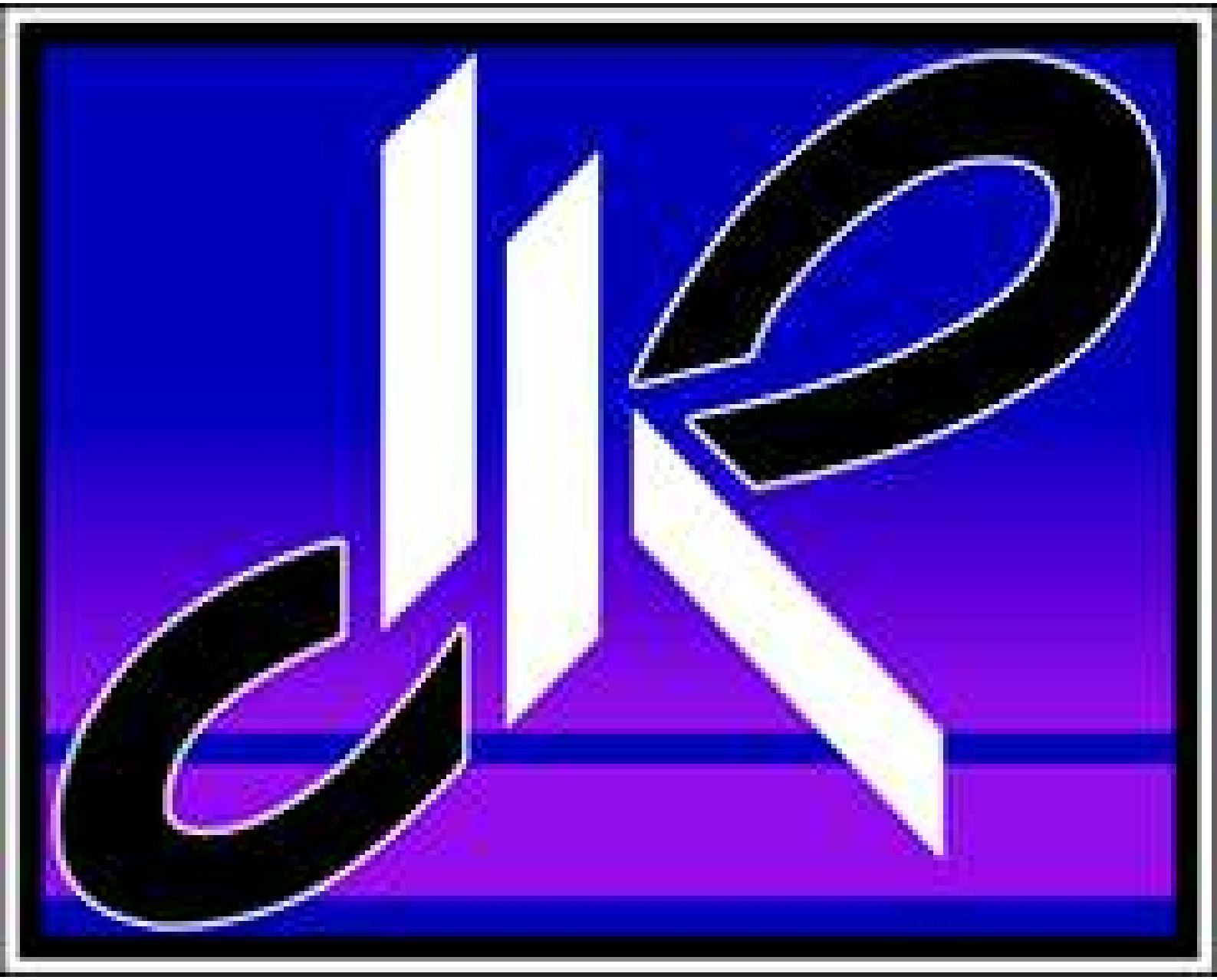

21.11.1993 MATEMATIKA
ANTARES VY TM★ Ω
ABDULAZIZ
RAHIMOV +998972774773

(2001.9.51)

Ushbu $\oint(x)=\sqrt{\frac{1+tg^2x}{1+ctg^2x}}\ \left(0<x<\frac{\pi}{2}\right)$ funksiya uchun boshlang'ich funksiyani toping.

(Yechish).

$$\oint(x)=\sqrt{\frac{\frac{1}{\cos^2x}}{\frac{1}{\sin^2x}}}=\sqrt{\frac{\sin^2x}{\cos^2x}}=\sqrt{tg^2x}=tgx.$$

$$tgx=\frac{\sin x}{\cos x}=\frac{1}{\cos x}\times\sin x\Rightarrow-\ln\cos x+C.$$

Javob; $-\ln\cos x+C$.

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ANTARES VY TM*
Ω
ABDULAZIZ
RAHIMOV +998972774773

(2003.9.48)

$\oint(x)=x-1-ctg^2x$ funksiyaning boshlang'ich funksiyasini toping (Yechish).

$$x-(1+ctg^2x)=x-\frac{1}{\sin^2x}\Rightarrow\frac{1}{2}x^2+ctgx+C.$$

Javob; $\frac{1}{2}x^2+ctgx+C.$

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ANTARES VY TM★ Ω

ABDULAZIZ

RAHIMOV +998972774773

(2003.2.61).

$\oint(x)=(x-1)x^3+e^{3x}-\frac{1}{3x}$ funksiyaning

boshlang'ich funksiyasini toping.

(Yechish).

$$x^4-x^3+e^{3x}-\frac{1}{3x}\Rightarrow\frac{1}{5}x^5-\frac{1}{4}x^4+\frac{1}{3}e^{3x}-\frac{1}{3}\ln|3x|+C.$$

Javob; $\frac{1}{5}x^5-\frac{1}{4}x^4+\frac{1}{3}e^{3x}-\frac{1}{3}\ln|3x|+C.$

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ANTARES VY TM★ Ω
ABDULAZIZ
RAHIMOV +998972774773

(2002.10.67)

$\oint(x)=x^{-4}$ funksiyaning $M(2;-3)$ nuqtadan o'tuvchi boshlang'ich funksiyasini toping.

(Yechish).

$$x^{-4}\Rightarrow-\frac{1}{3x^3}+C.\ \overset{2;-3}{(x;y)}.$$

$$-\frac{1}{24}+C=-3.\ \Rightarrow\ C=-\frac{72+1}{24}=-\frac{71}{24}.$$

$$-\frac{1}{3x^3}-\frac{71}{24}=-\frac{71x^3+8}{24x^3}.$$ Javob; $-\frac{71x^3+8}{24x^3}$.

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ANTARES VY TM★ Ω

ABDULAZIZ
RAHIMOV +998972774773

(2002.3.51)

$\oint(x)=(tgx+ctgx)^2$ funksiyaning
boshlang'ichini funksiyasini aniqlang
(Yechish).

$tg^2x+2tgxctgx+ctg^2x=1+tg^2x+1+ctg^2x.$

$\frac{1}{\cos^2x}+\frac{1}{\sin^2x}\Rightarrow tgx-ctgx+C.$ Javob; $tgx-ctgx+C.$

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ANTARES VY TM*
ABDULAZIZ
RAHIMOV +998972774773

(2001.12.50).

Ushbu $\oint(x)=(\ln\sin x+1)\cos x$ funksiyasi uchin boshlang'ich funksiyani toping

(Yechish).

$$\int(\ln\sin x+1)\cos x dx.$$

$$\int(\ln\sin x)\cos x+\cos x dx.$$

$$\int(\ln\sin x)\cos x dx+\int\cos x dx.$$

$$dx=\frac{1}{t}\times dt.\ t=\sin x.\ t=\cos x.$$

$$\int\cos x dx=\sin x.$$

$$\int(\ln\sin x)\cos x\times\frac{1}{\cos x}\times dt+\sin x.$$

$$\int\ln(t)dt+\sin x \Rightarrow \ln(t)\times t-\int t\times\frac{1}{t}dt+\sin x.$$

$$\ln(t)\times t-t+\sin x.$$

$$\ln(\sin x)\sin x-\sin x+\sin x=\ln(\sin x)\sin x.$$

Javob; $\sin x(\ln\sin x)+C.$

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ANTARES VY TM* Ω
ABDULAZIZ
RAHIMOV +998972774773

(2002.1.69)

Agar $F'(x)=\sin x$ va $F(1)=3$ bo'lsa.

$F(x)$ ni toping.

(Yechish).

$\sin x \Rightarrow -\cos x + C$.. $\overset{1;3}{(x;y)}$.

$F(1)=-\cos 1+C=3$.

$C=3+\cos 1$. Javob; $\overset{3+\cos 1-\cos x}{-\cos x+3+\cos 1}$.

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ANTARES VY TM★ Ω
ABDULAZIZ
RAHIMOV +998972774773

(2001.9.52)

Ushbu $\oint(x)=\frac{1-\sin^2 x}{1-\sin x}-\frac{1-\cos^2 x}{1+\cos x}$ funksiya uchun boshlang'ich funksiyani toping.

(Yechish).

$$\frac{(1-\sin x)(1+\sin x)}{1-\sin x}-\frac{(1-\cos x)(1+\cos x)}{1+\cos x}.$$

$1+\sin x-1+\cos x=\sin x+\cos x.$

$\sin x-\cos x\Rightarrow-\cos x+\sin x+C.$

Javob; $-\cos x+\sin x+C.$

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ANTARES VY TM★ Ω
ABDULAZIZ
RAHIMOV +998972774773

(2003.11.18).

Agar $\oint'(\mathbf{x})=12\mathbf{x}^2-2\mathbf{x}-14$ **va** $\oint(2)=5$ **bo'lsa.** $\oint(0)$ **ni aniqlang.**

(Yechish).

$12\mathbf{x}^2-2\mathbf{x}-14\Rightarrow 4\mathbf{x}^3-\mathbf{x}^2-14\mathbf{x}+\mathbf{C}.$

$(\overset{2;5}{\mathbf{x};\mathbf{y}})$. $\oint(2)=32-4-28+\mathbf{C}=5$. $\mathbf{C}=5$.

$\oint(0)=0-0-0+5=5$. Javob; 5

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ANTARES VY TM* Ω

ABDULAZIZ

RAHIMOV +998972774773

(2002.7.80).

$\oint(x)=8x^3-5$ funksiyaning grafigi M(1;4) nuqtadan o'tuvchi boshlang'ich funksiyani toping.

(Yechish).

$8x^3-5 \Rightarrow 2x^4-5x+C.$

$\overset{1;4}{(x;y)}$. $\oint(1)=2-5+C=4.$

$-3+C=4. \Rightarrow C=7.$ Javob; $2x^4-5x+7.$

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ANTARES VY TM
ABDULAZIZ
RAHIMOV +998972774773

(2003.7.26).

$\oint'(\mathbf{x})=6\mathbf{x}^3-8\mathbf{x}+3.\ \ \oint(-2)=0.\ \ \oint(2)=?$

(Yechish).

$$6\mathbf{x}^3-8\mathbf{x}+3\Rightarrow\frac{3}{2}\mathbf{x}^4-4\mathbf{x}^2+3\mathbf{x}+\mathbf{C}.$$

$\overset{-2;0}{(\mathbf{x};\mathbf{y})}.\ \oint(-2)=\frac{3}{2}\times16-16-6+\mathbf{C}=0.$

$24-22+\mathbf{C}=0.\ \Rightarrow\ \mathbf{C}=-2.$

$\oint(2)=\frac{3}{2}\times16-16+6-2=24-12=12$ Javob; 12.

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ANTARES VY TM★ Ω

ABDULAZIZ
RAHIMOV +998972774773

(2003.6.19).

$\oint'(\mathbf{x})=6\mathbf{x}^3-8\mathbf{x}+3.\ \ \oint(2)=0.\ \ \oint(-2)=?$

(Yechish).

$6\mathbf{x}^3-8\mathbf{x}+3\Rightarrow\frac{3}{2}\mathbf{x}^4-4\mathbf{x}^2+3\mathbf{x}+\mathbf{C}.$

$\overset{2;0}{(\mathbf{x};\mathbf{y})}.\ \ \oint(2)=\frac{3}{2}\times16-16+6+\mathbf{C}=0.$

$24-10+\mathbf{C}=0.\ \Rightarrow\ \mathbf{C}=-14.$

$\oint(-2)=\frac{3}{2}\times16-16-6-14=24-36=-12$ **Javob;** $-12.$

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ANTARES VY TM★ Ω
ABDULAZIZ
RAHIMOV +998972774773

(2003.3.54)

$\oint(x)=\frac{1}{\sin^2 2x\cos^2 2x}$ funksiyaning

boshlang'ichini toping.

(Yechish).

$$\frac{\sin^2 2x+\cos^2 2x}{\sin^2 2x\cos^2 2x}=\frac{\sin^2 2x}{\sin^2 2x\cos^2 2x}+\frac{\cos^2 2x}{\sin^2 2x\cos^2 2x}.$$

$$\frac{1}{\cos^2 2x}+\frac{1}{\sin^2 2x}\Rightarrow\frac{1}{2}tg2x-\frac{1}{2}ctg2x+C.$$

Javob; $\frac{1}{2}tg2x-\frac{1}{2}ctg2x+C.$

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ANTARES VY TM★ Ω
ABDULAZIZ
RAHIMOV +998972774773

(2002.10.32)

$\oint(x)=6x^2-6x+7$ funksiyaning $M(1;0)$ nuqtadan o'tuvchi boshlang'ich funksiyasini aniqlang.

(Yechish).

$6x^2-6x+7 \Rightarrow 2x^3-3x^2+7x+C.$

$\overset{1;0}{(x;y)}.$

$\oint(1)=2-3+7+C=0. \quad C=-6.$

Javob; $2x^3-3x^2+7x-6.$

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ANTARES VY TM* Ω

ABDULAZIZ

RAHIMOV +998972774773

(2002.2.31)

Agar $\oint'(x)=6x^2-3x+5$ **va** $\oint(4)=130$

bo'lsa. $\oint(0)$.

(Yechish).

$6x^2-3x+5\Rightarrow 2x^3-\frac{3}{2}x^2+5x+C.$

$(x;y)^{4;130}$. $\oint(4)=2\times 64-\frac{3}{2}\times 16+20+C=130.$

$128-24+20+C=130.\Rightarrow\ 124+C=130.\ \Rightarrow\ C=6.$

$\oint(0)=0-0+0+6=6.$ Javob; 6.

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ANTARES VY TM ★ Ω

ABDULAZIZ
RAHIMOV +998972774773

(2001.12.51)

Ushbu $\oint(x)=\frac{\sin 2x-2\cos x}{2(\sin x-\sin^2 x)}\ \left(0<x<\frac{\pi}{2}\right)$

funksiya uchun boshlang'ich

funksiyani toping.

(Yechish).

$$\frac{2\sin x\cos x-2\cos x}{2\sin x(1-\sin x)}=-\frac{2\cos x(1-\sin x)}{2\sin x(1-\sin x)}=-\operatorname{ctg}x.$$

$$-\operatorname{ctg}x=-\frac{\cos x}{\sin x}=-\frac{1}{\sin x}\times\cos x=-\ln\sin x+C.$$ Javob; $-\ln\sin x+C$.

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ANTARES VY TM★ Ω
ABDULAZIZ
RAHIMOV +998972774773

(2001.11.41)

Agar $F'(x)=3x^2-2x$ va $F(0)=4$ bo'lsa. $F(x)$ funksiyani toping.

(Yechish).

$3x^2-2x \Rightarrow x^4-x^2+C$. $\overset{0;4}{(x;y)}$.

$F(0)=0-0+C=4$. $C=4$. Javob; x^4-x^2+4.

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ANTARES VY TM* Ω
ABDULAZIZ
RAHIMOV +998972774773

(2001.9.50)

Ushbu $\oint(x)=\ln^{-1}x-\ln^{-2}x$ funksiya uchun boshlang'ich funksiyani toping.

(Yechish).

$$\frac{1}{\ln x}-\frac{1}{\ln^2 x}=\frac{\ln x-1}{\ln^2 x}=\frac{x'\ln x-(\ln x)'x}{\ln^2 x}.$$

$\frac{x}{\ln x}+C$. Javob; $\frac{x}{\ln x}+C$.

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ANTARES VY TM★ Ω

ABDULAZIZ
RAHIMOV +998972774773

(2001.8.30)

Agar $F'(x)=e^{-3x}$ va $F(1)=0$ bo'lsa.

$F(x)$ ni toping.

(Yechish).

$e^{-3x} \Rightarrow -\frac{1}{3}e^{-3x}+C.$ $\overset{1;0}{(x;y)}.$

$-\frac{1}{3}e^{-3}+C=0.$ $C=\frac{1}{3}e^{-3}.$ Javob; $-\frac{1}{3}e^{-3x}+\frac{1}{3}e^{-3}.$

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ANTARES VY TM★ Ω
ABDULAZIZ
RAHIMOV +998972774773

(2001.7.51)

Ushbu $\oint(x)=\frac{1}{\sqrt{x-2}}$ funksiyaning grafigi $A(3;5)$ nuqtadan o'tuvchi boshlang'ich funksiyani toping.

(Yechish).

$\frac{1}{\sqrt{x-2}} \Rightarrow 2\sqrt{x-2}+C.\ \overset{3;5}{(x;y)}.$

$2\sqrt{3-2}+C=5. \Rightarrow 2+C=5.\ C=3.$ Javob; $2\sqrt{x-2}+3.$

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ANTARES VY TM★ Ω
ABDULAZIZ
RAHIMOV +998972774773

(2001.4.24).

Ushbu $\oint(x)=\frac{1}{x}$ funksiyaning grafigi $(e;2)$ nuqtadan o'tuvchi boshlang'ich funksiyani topung.

(Yechish).

$\frac{1}{x}\Rightarrow \ln|x|+C.\quad \overset{e;2}{(x;y)}.$

$\ln|e|+C=2.\ \Rightarrow\ 1+C=2.$

$C=1.$ Javob; $\ln|x|+1.$

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ANTARES VY TM* Ω
ABDULAZIZ
RAHIMOV +998972774773

(2001.4.21)

Ushbu $\oint(x)=-\frac{4\cos 2x}{\sin^2 2x}$ funksiyaning

boshlang'ich funksiyasini toping.

(Yechish).

$$-\frac{4(\cos^2 x-\sin^2 x)}{4\sin^2 x\cos^2 x}=-\left(\frac{\cos^2 x}{\sin^2 x\cos^2 x}-\frac{\sin^2 x}{\sin^2 x\cos^2 x}\right).$$

$$-\left(\frac{1}{\sin^2 x}-\frac{1}{\cos^2 x}\right)=-\frac{1}{\sin^2 x}+\frac{1}{\cos^2 x}.$$

$$-\frac{1}{\sin^2 x}+\frac{1}{\cos^2 x}\Rightarrow \operatorname{ctg}x+\operatorname{tg}x+C.$$ Javob; tgx+ctgx+c. $\operatorname{ctg}x+\operatorname{tg}x+C.$

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ANTARES VY ΩTM*
ABDULAZIZ
RAHIMOV +998972774773

(2001.2.37)

Ushbu $\oint(x)=\frac{\cos 2x}{\sin x-\cos x}$ uchun boshlang'ich funksiyani toping.

(Yechish).

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

$-\sin x-\cos x \Rightarrow \cos x-\sin x+C$. Javob; $-\sin x+\cos x+C$.

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ANTARES VY TM* Ω

ABDULAZIZ

RAHIMOV +998972774773

(2001.1.37)

Agar $F'(x)=e^x+\sin 2x$ va $F(0)=3,5$ bo'lsa, $F(x)$ ni toping.

(Yechish).

$e^x+\sin 2x \Rightarrow e^x-\frac{1}{2}\cos 2x+C.$ $\overset{0;3,5}{(x;y)}$.

$e^0-\frac{1}{2}\cos 0+C=3,5 \Rightarrow 1-\frac{1}{2}+C=3,5.$

$\frac{1}{2}+C=3,5. \Rightarrow C=3,5-\frac{1}{2}=\frac{35}{10}-\frac{1}{2}=\frac{7-1}{2}=3.$ Javob; $e^x-\frac{1}{2}\cos 2x+3.$

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ANTARES VY TM★ Ω
ABDULAZIZ
RAHIMOV +998972774773

(1999.4.32)

$y=\pi\sin\pi x+2x-4$ funksiyaning $x=1$ bo'lganda qiymati 3 ga teng bo'ladigan boshlang'ich funksiyasi x ning qanday qiymatida no'lga aylanadi?

(Yechish).

$\pi\sin\pi x+2x-4 \Rightarrow -\cos\pi x+x^2-4x+C.$ $\overset{1;3}{(x;y)}$.

$-\cos\pi+1-4+C=3. \Rightarrow 1+1-4+C=3.$

$-2+C=3. \quad C=3+2=5.$

$-\cos\pi x+x^2-4x+5=0.$

$x\neq 0.\ x\neq 1.\ x\neq 0{,}5.\ x\neq -2.\ x=2.$

$x=2 \Rightarrow y=0.$ Javob; 2.

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ANTARES VY TM★ Ω
ABDULAZIZ
RAHIMOV +998972774773

(2000.8.69)

Ushbu $\oint(x)=\frac{1}{2\sqrt{(1-x)^3}}$ funksiyaning

boshlang'ichini toping.

(Yechish).

$$\frac{1}{2\sqrt{(1-x}\sqrt{(1-x)^2}}=\frac{-\frac{1}{2\sqrt{1-x}}\times(-1)}{\sqrt{(1-x)^2}}=\frac{0-(\sqrt{1-x})'}{\sqrt{(1-x)^2}}.$$

$\frac{1}{\sqrt{1-x}}$. Javob; $\frac{1}{\sqrt{1-x}}$.

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ANTARES VY TM*
ABDULAZIZ
RAHIMOV +998972774773

(2000.5.49)

Funksiyaning boshlang'ichini toping.

$$\left(\frac{\sin 2x-2\sin^2 x}{1-\operatorname{tg}x}\right)^2.$$

(Yechish).

$$\left(\frac{2\sin x\cos x-2\sin^2 x}{1-\dfrac{\sin x}{\cos x}}\right)^2=\left(\frac{2\sin x(\cos x-\sin x)}{\dfrac{\cos x-\sin x}{\cos x}}\right)^2.$$

$$(2\sin x\cos x)^2=\sin^2 2x=\frac{1-\cos 4x}{2}.$$

$$\frac{1}{2}-\frac{1}{2}\cos 4x\Rightarrow\frac{1}{2}x-\frac{1}{8}\sin 4x+C.$$ Javob; $\frac{1}{2}x-\frac{1}{8}\sin 4x+C.$

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ANTARES VY TM
ABDULAZIZ
RAHIMOV +998972774773

(1999.3.60)

Ushbu $\oint(x)=\frac{4}{(3-2x)^2}$ funksiyaning grafigi $\left(-\frac{1}{2};\frac{1}{16}\right)$ nuqtaning o'tuvchi boshlang'ich funksiyani toping.

(Yechish).

$$\frac{4}{(3-2x)^2}\Rightarrow\frac{-2\times(-2)}{(3-2x)^2}=\frac{2'(3-2x)-(3-2x)'\times 2}{(3-2x)^2}.$$

$\frac{2}{3-2x}+C.$ $\left(-\frac{1}{2};\frac{1}{16}\right)$ $(x;y)$.

$$\frac{2}{3+2\times\frac{1}{2}}+C=\frac{1}{16}.\Rightarrow\ \frac{2}{3+1}+C=\frac{1}{16}.\ \Rightarrow\ \frac{1}{2}+C=\frac{1}{16}.$$

$$C=\frac{1}{16}-\frac{1}{2}=\frac{1-8}{16}=-\frac{7}{16}.$$ Javob; $\frac{2}{3-2x}-\frac{7}{16}.$

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ANTARES VY TM* Ω

ABDULAZIZ
RAHIMOV +998972774773

(2001.1.36).

$\oint(x)=3x^2-2\cos\left(2x+\frac{\pi}{3}\right)$ funksiyaning koordinata boshidan o'tuvchi boshlang'ich funksiyani toping.

(Yechish).

$$3x^2-2\cos x\left(2x+\frac{\pi}{3}\right)\Rightarrow x^3-\sin\left(2x+\frac{\pi}{3}\right)+C. \quad \overset{0;0}{(x;y)}.$$

$$\oint(0)=0-\sin\frac{\pi}{3}+C=0. \Rightarrow -\frac{\sqrt{3}}{2}+C=0.$$

$C=\frac{\sqrt{3}}{2}$. Javob; $x^3-\sin\left(2x+\frac{\pi}{3}\right)+\frac{\sqrt{3}}{2}$.

(2000.9.1)

F(x)=lncosx+C funksiya quydagi funksiyalardan qaysi birining boshlang'ich funksiyasi bo'la oladi?

(Yechish).

$$F'(x)=(\ln\cos x+C)'=\frac{1}{\cos x}\times(-\sin x)=-\operatorname{tg}x.$$

Javob; $-\operatorname{tg}x$.

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ANTARES VY TM★ Ω
ABDULAZIZ
RAHIMOV +998972774773

(1999.10.45)

Ushbu $\oint(x)=2\cos^2\left(\frac{x}{2}\right)$ funksiyaning

M(0;3) nuqtadan o'tganda boshlang'ich funksiyani toping.

(Yechish).

$\cos^2\left(\frac{x}{2}\right)=\frac{1+\cos x}{2}. \Rightarrow 2\times\frac{1+\cos x}{2}=1+\cos x.$

$1+\cos x \Rightarrow x+\sin x+C.\ \overset{0;3}{(x;y)}.$

$x+\sin x+C=y.\ 0+0+C=3.\ C=3.$

Javob; $F(x)=x+\sin x+3.$

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ANTARES VY TM★ Ω
ABDULAZIZ
RAHIMOV +998972774773

(1999.8.41)

Ushbu $\oint(x)=3x^2-2$ funksiyaning boshlang'ich funksiyalaridan qaysi birining grafigi $M(2;4)$ nuqtadan o'tadi?

(Yechish).

$3x^2-2 \Rightarrow x^3-2x+C.$ $\overset{2;4}{(x;y)}$

$x^3-2x+C=y. \Rightarrow 8-4+C=4.$

$4-C=4 \Rightarrow C=4-4=0.$ Javob; $x^3-2x.$

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ANTARES VY TM* Ω

ABDULAZIZ
RAHIMOV +998972774773

(1999.8.40)

Ushbu $\oint(x)=\frac{3}{4\sqrt{x}}$ funksiyaning boshlang'ichini toping.

(Yechish).

$\frac{3}{4\sqrt{x}} \Rightarrow \frac{3}{2}\sqrt{x}+C.$ Javob; $\frac{3}{2}\sqrt{x}+C.$

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ANTARES VY TM* Ω

ABDULAZIZ RAHIMOV +998972774773

(1999.7.29)

Ushbu $y=\dfrac{2x}{(x^2+1)\ln 10}$ funksiyaning boshlang'ich funksiyasini toping.

(Yechish).

$\dfrac{2x}{(x^2+1)\ln 10}\Rightarrow \lg(x^2+1)+C$. Javob; $Y=\lg(x^2+1)+C$.

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ANTARES VY TM★ Ω
ABDULAZIZ
RAHIMOV +998972774773

(1999.3.59)

Ushbu $\oint(x)=x+ctg^2(x)$ funksiyaning boshlang'ich funksiyasini toping.

(Yechish).

$$y'=\left(\frac{x^2}{x}-x-ctgx+C\right)'=x-1+\frac{1}{\sin^2 x}.$$

$$\frac{x\sin^2 x-\sin^2+1}{\sin^2 x}=x+\frac{\cos^2 x}{\sin^2 x}=x+ctg^2 x.$$

Javob; $\frac{x^2}{x}-x-ctgx+C.$

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ANTARES VY TM* Ω

ABDULAZIZ

RAHIMOV +998972774773

(1999.2.43)

$F(x)=\frac{1}{2}x^2+\cos x+C$ funksiya

$y=\oint(x)$ funksiyaning boshlang'ich funksiyasi. $y=\oint(x)$ funksiyaning hosilasini toping.

(Yechish).

$$F'(x)=\left(\frac{1}{2}x^2+\cos x+C\right)'=x-\sin x.$$

$$\oint'(x)=(x-\sin x)'=1-\cos x.$$

$1-\cos x=2\times\frac{1-\cos x}{2}=2\sin^2\frac{x}{2}$. Javob; $2\sin^2\frac{x}{2}$.

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ANTARES VY TM★ Ω

ABDULAZIZ
RAHIMOV +998972774773

(1999.8.1).

Agar $\phi'(x)=\sin 2x+\frac{1}{x-1}$ bo'lsa,

$\phi(x)$ funksiyani toping.

(Yechish).

$$\text{sun}2x+\frac{1}{x-1}\Rightarrow-\frac{1}{2}\cos 2x+\ln|x-1|+C.$$

Javob; $-\frac{1}{2}\cos 2x+\ln|x-1|+C.$

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ANTARES VY TM*

ABDULAZIZ

RAHIMOV +998972774773

(1999.1.26)

$\oint(x)=\frac{1}{x^2}-\cos x$ funksiyaning

boshlang'ich funksiyasini toping.

(Yechish).

$\frac{1}{x^2}-\cos x \Rightarrow -\frac{1}{x}-\sin x+C.$ Javob; $-\frac{1}{x}-\sin x+C.$

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ANTARES VY TM★ Ω
ABDULAZIZ
RAHIMOV +998972774773

(1998.11.78)

Ushbu $\sqrt{x}+\sqrt[3]{x}$ funksiyaning boshlang'ich funksiyasini [toping.

(Yechish).

$$\sqrt{x}+\sqrt[3]{x}\Rightarrow\frac{2}{3}\sqrt{x^3}+\frac{3}{4}\sqrt{x^4}+C.$$

Javob; $\frac{2}{3}\sqrt{x^3}+\frac{3}{4}\sqrt{x^4}+C.$

(1998.10.74)

Ushbu $\dfrac{1}{\sin^2(3x+1)}$ funksiyaning boshlang'ich funksiyasini toping.

(Yechish).

$$\frac{1}{\sin^2(3x+1)} \Rightarrow -\frac{1}{3}\operatorname{ctg}(3x+1)+C.$$

Javob; $-\dfrac{1}{3}\operatorname{ctg}(3x+1)+C.$

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ANTARES VY TM* Ω

ABDULAZIZ

RAHIMOV +998972774773

(1998.9.41).

$F(x)=2\cos 2x+\sin x+C$ funksiya quydagi funksiyalardan qaysi birining boshlang'uch funksiyasi hisoblanadi.

(Yechish).

$F'(x)=(2\cos 2x+\sin x+C)'=-4\sin 2x+\cos x.$

Javob; $\oint(x)=-4\sin 2x+\cos x.$

(1998.8.31).

Ushbu $y=\frac{2}{e^x}$ funksiyaning boshlang'ich.

funksiyani toping.

(Yechish).

$\frac{2}{e^x}=2e^{-x}\Rightarrow -2e^{-x}$. Javob; $-2e^{-x}$.

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ANTARES VY TM★ Ω

ABDULAZIZ

RAHIMOV +998972774773

(1998.6.29).

Ushbu $x\cos x^2$ funksiyaning boshlang'ich funksiyasini toping.

(Yechish).

$x\cos x^2 \Rightarrow \frac{1}{2}\sin x^2 + C$. Javob; $\frac{1}{2}\sin x^2 + C$.

(1998.5.28)

Ushbu $y=2(2x+5)^4$ funksiyaning boshlang'ich funksiyasin toping.

(Yechish).

$2(2x+5)^4 \Rightarrow \frac{(2x+5)^5}{5}+C$. Javob; $\frac{(2x+5)^5}{5}+C$.

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ABDULAZIZ
RAHIMOV +998972774773

(1998.3.27)

Ushbu $\dfrac{1}{\cos^2\left(\dfrac{x}{3}+1\right)}$ funksiyaning boshlang'ich funksiyasini toping.

(Yechish).

$$\frac{1}{\cos^2\left(\dfrac{x}{3}+1\right)} \Rightarrow 3\operatorname{tg}\left(\frac{x}{3}+1\right)+C.$$

Javob; $3\operatorname{tg}\left(\dfrac{x}{3}+1\right)+C.$

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ABDULAZIZ
RAHIMOV +998972774773

(1998.2.43)

Ushbu $F(x)=e^x-\frac{1}{3}\sin 3x+\operatorname{ctg}x+C$

funksiya quydagi funksiyalardan qaysi birining boshlang'ich funksitasi (Yechish).

$$y'=\left(e^x-\frac{1}{3}\sin 3x+\operatorname{ctg}x+C\right)'=e^x-\cos 3x-\frac{1}{\sin^2 x}.$$

Javob; $e^x-\cos 3x-\frac{1}{\sin^2 x}$.

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ABDULAZIZ
RAHIMOV +998972774773

(1998.1.31)

Ushbu $y=e^{1-3x}$ funksiyaning boshlang'ich funksiyasini ko'rsating.

(Yechish).

$e^{1-3x} \Rightarrow -\frac{1}{3}e^{1-3x}+C$. Javob; $-\frac{1}{3}e^{1-3x}+C$.

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ABDULAZIZ
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(1997.12.47)

Agar $y=F(x)$ funksiya $y=\oint(x)$. funksiyaning boshlang'ich funksiyasi bo'lsa. $y=-2\oint(-2x)$ funksiyaning boshlang'ich funksiyasini toping.

(Yechish).

$-2\oint(-2x)\Rightarrow F(-2x)$. Javob; $F(-2x)$.

(1997.12.46)

$F(x)=-2ctgx-3x+C$ funksiya quydagi funksiyalardan qaysi birining boshlang'ich funksiyasi bo'ladi?

(Yechish).

$$F(x)=(-2ctgx-3x+C)'=\frac{2}{\sin^2 x}-3.$$

Javob; $\frac{2}{\sin^2 x}-3.$

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ABDULAZIZ
RAHIMOV +998972774773

(1997.11.23)

Agar $F'(x)=x-4$, $F(2)=0$ bo'lsa. $F(x)$ funksiyani aniqlang.

(Yechish).

$$x-4 \Rightarrow \frac{x^2}{2}-4x+C$$

$$F(2)=\frac{4}{2}-8+C=0. \Rightarrow -6+C=0.$$

$C=6$. Javob; $F(x)=\frac{1}{2}x^2-4x+6$.

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ABDULAZIZ
RAHIMOV +998972774773

(1997.10.32)

Quydagilardan qaysi biri $\oint(x)=$ $\sin 2x\cos x$ funksiya boshlang'ich funksiyaning umumiy ko'rinishi?

(Yechish).

$$\sin 2x\cos x=\frac{1}{2}(\sin(2x-x)+\sin(2x+x)).$$

$$\frac{1}{2}(\sin x+\sin 3x)=\frac{1}{2}\sin x+\frac{1}{2}\sin 3x.$$

$$\frac{1}{2}\sin x+\frac{1}{2}\sin 3x\Rightarrow-\frac{1}{2}\cos x-\frac{1}{6}\cos 3x+C.$$

Javob; $-\frac{1}{2}\cos x-\frac{1}{6}\cos 3x+C.$

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ANTARES VY TM* Ω

ABDULAZIZ

RAHIMOV +998972774773

(1997.9.91).

Agar $\oint'(x)=\frac{1}{x\ln 10}+10x+5$ **va**

$\oint(1)=6$ **bo'lsa.** $\oint(x)$ **ni toping.**

(Yechish).

$$\frac{1}{x\ln 10}+10x+5\Rightarrow \lg x+5x^2+5x+C.$$

$$\oint(1)=\lg 1+5+5+C=6.$$

$$c=6-10=-4.$$

Javob; $\oint(x)=\lg x+5x^2+5x-4.$

(1997.9.35)

Ushbu $\oint(x)=\text{ctg}^2x$ funksiyaning boshlang'ichini toping.

(Yechish).

$$\text{ctg}^2x=\frac{\cos^2x}{\sin^2x}=\frac{1-\sin^2x}{\sin^2x}=\frac{1}{\sin^2x}-1.$$

$$\frac{1}{\sin^2x}-1\Rightarrow -\text{ctg}x-x+C=-x-\text{ctg}x+C.$$

Javob; $-x-\text{ctg}x+C.$

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ABDULAZIZ
RAHIMOV +998972774773

(1997.8.48)

Agar $y=F(x)$ funksiya $y=\oint(x)$ funksiya uchun boshlang'ich funksiya bo'lsa.

$y=2\oint(-2x)$ funksyaning boshlang'ich funksiyasini toping.

(Yechish).

$2\oint(-2x)\Rightarrow -F(-2x)$. Javob; $-F(-2x)$.

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ABDULAZIZ
RAHIMOV +998972774773

(1997.8.47)

$F(x)=ctgx-2x+C$ quydagi funksiyalardan qaysi birining boshlang'ich funksiyasi.

(Yechish).

$$\oint'(x)=(ctgx-2x+C)'=-\frac{1}{\sin^2 x}-2.$$

Javob; $\oint(x)=-\frac{1}{\sin^2 x}-2.$

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ABDULAZIZ
RAHIMOV +998972774773

(1997.7.32)

Ushbu $\oint(x)=\sin x\cos 2x$ funksiya boshlang'ich funksiyasining umumiy ko'rinishini ko'rsating.

(Yechish).

$$\sin x\cos 3x=\frac{1}{2}(\sin(x-2x)+\sin(x+2x)).$$

$$\frac{1}{2}(-\sin x+\sin 3x)=-\frac{1}{2}\sin x+\frac{1}{2}\sin 3x$$

$$-\frac{1}{2}\sin x+\frac{1}{2}\sin 3x=\frac{1}{2}\cos x-\frac{1}{6}\cos 3x+C.$$

Javob; $\frac{1}{2}\cos x-\frac{1}{6}\cos 3x+C.$

(1997.6.23)

Agar $F'(x)=2x-1$ va $F(1)=2$ bo'lsa. $F(x)$ funksiyani aniqlang.

(Yechish).

$2x-1 \Rightarrow x^2-x.$

$F(1)=1-1+C=2. \quad C=2.$

Javob; $F(x)=x^2-x+2.$

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ANTARES VY TM* Ω
ABDULAZIZ
RAHIMOV +998972774773

(1997.5.35)

Ushbu $\phi(x)=\sin^2 x$ funksiyaning boshlang'ich funksiyasini toping.

(Yechish).

$$\sin^2 x=\frac{1-\cos 2x}{2}.$$

$$\frac{1}{2}-\frac{1}{2}\cos 2x \Rightarrow \frac{1}{2}x-\frac{1}{4}\sin 2x+C.$$

Javob; $\frac{1}{2}x-\frac{1}{4}\sin 2x+C.$

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ANTARES VY$_{\Omega}^{TM\star}$

ABDULAZIZ
RAHIMOV +998972774773

(1997.4.31).

Agar $F'(x)=\cos x+2x$ va $F\left(\frac{\pi}{2}\right)=3$

bo'lsa. $F(x)$ ni toping.

(Yechish).

$\cos x \Rightarrow \sin x$. $2x \Rightarrow x^2$.

$\sin x+x^2+C$.

$F\left(\frac{\pi}{2}\right)=\sin\frac{\pi}{2}+\frac{\pi^2}{4}+C=3$.

$C=3-1-\frac{\pi^2}{2}=2-\frac{\pi^2}{2}$. Javob; $F(x)=\sin x+x^2+2-\frac{\pi^2}{4}$.

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ABDULAZIZ
RAHIMOV +998972774773

(1997.3.32)

Ushbu $\oint(x)=\sin^2 2x$ funksiyani boshlang'ich funksiyasining umumiy ko'rinishini ko'rsating.

(Yechish).

$$\sin^2 2x=\frac{1-\cos 4x}{2}.$$

$$\oint(x)=\frac{1-\cos 4x}{2}. \Rightarrow \oint(x)=\frac{1}{2}-\frac{\cos 4x}{2}.$$

$$\frac{1}{2}\Rightarrow \frac{1}{2}x. \qquad \frac{\cos 4x}{2}\Rightarrow \frac{1}{8}\sin 4x.$$

Javob; $\frac{1}{2}x-\frac{1}{8}\sin 4x+C.$

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ABDULAZIZ
RAHIMOV +998972774773

(1997.2.48).

Agar $y=F(x)$ funksiya $y=\oint(x)$ funksiyaning boshlang'ich funksiyasi bo'lsa, $y=\oint\left(\frac{x}{2}\right)$ funksiyaning boshlang'ich funksiyasini toping.

(Yechish).

$\oint\left(\frac{x}{2}\right)\Rightarrow 2F\left(\frac{x}{2}\right)$. Javob; $2F\left(\frac{x}{2}\right)$.

(1997.2.47)

F(x)=3tgx+5x+C funksiya quydagi funksiyalardan qaysi birining boshlang'ich funksiyasi.

(Yechish).

$y'=(3tgx+5x+C)'=\frac{3}{\cos^2 x}+5$. Javob; $y=\frac{3}{\cos^2 x}+5$.

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ANTARES VY TM* Ω
ABDULAZIZ
RAHIMOV +998972774773

(1997.1.23)

Agar $F'(x)=x+2$ va $F(2)=2$ bo'lsa $F(x)$ funksiyani aniqlang

(Yechish).

$$x \Rightarrow \frac{1}{2}x^2. \quad 2 \Rightarrow 2x.$$

$$F(x)=\frac{1}{2}x^2+2x+C.$$

$$F(2)=\frac{1}{2}\times 4+4+C=2. \Rightarrow 2+4+C=2.$$

$$C=2-6=-4.$$

Javob; $F(x)=\frac{1}{2}x^2+2x-4.$

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ANTARES VY TM★ Ω
ABDULAZIZ
RAHIMOV +998972774773

(1996.13.25)

Ushbu $F(x)=x-\frac{x^2}{2}$ funksiyaning $(6;0)$ nuqtadan o'tuvchi boshlang'ich funksiyasini toping.

(Yechish).

$x \Rightarrow \frac{x^2}{2}.\ \frac{x^2}{2} \Rightarrow \frac{x^3}{6}.$

$\frac{x^2}{2}-\frac{x^3}{6}+C.\ \overset{6;0}{(x;y)}.$

$\frac{36}{2}-\frac{6^3}{6}+C=0. \Rightarrow 18-36+C=0.$

$-18+C=0. \Rightarrow C=18.$

Javob; $\frac{x^2}{2}-\frac{x^3}{3}+18.$

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ANTARES VY TM★ Ω
ABDULAZIZ
RAHIMOV +998972774773

(1996.12.82)

$\oint(x)=x^2$ funksiyaning $(3;2)$ nuqtadan o'tuvchi boshlang'ich funksiyasini toping.

(Yechish).

$$x^2 \Rightarrow \frac{x^3}{3}+C. \quad (x;y)^{3;2}.$$

$$\frac{27}{3}+C=2. \Rightarrow 9+C=2. \Rightarrow C=-7.$$

Javob; $\frac{x^3}{3}-7.$

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ANTARES VY TM
ABDULAZIZ
RAHIMOV +998972774773

(1996.12.37).

Quydagi funksiyalardan qaysi biri $y'=3y$ tenglamaning yechimi bo'ladi?

(Yechish).

$$\frac{dy}{dx}=3y \Rightarrow \frac{dy}{y}=3dx. \quad \int\frac{dy}{y}=\int 3dx. \Rightarrow \ln y=3x\ln e+\ln C.$$

$$\ln y-\ln C=\ln e^{3x}. \quad \ln\left(\frac{y}{C}\right)=\ln e^{3x}.$$

$$\frac{y}{C}=e^{2x}. \quad y=Ce^{3x}. \quad \text{Javob; } y=Ce^{3x}.$$

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ANTARES VY TM*
ABDULAZIZ
RAHIMOV +998972774773

(1996.11.36)

2cos3x funksiya uchun boshlang'ich funksiyaning umumiy ko'rinishini toping.

(Yechish).

$2\cos 3x \Rightarrow \frac{2}{3}\sin 3x + C$. Javob; $\frac{2}{3}\sin 3x + C$.

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ANTARES VY Ω TM*
ABDULAZIZ
RAHIMOV +998972774773

(1996.11.36).

Quydagi funksiyalarning qaysi biri $2y'=y$ tenglamaning yechimi bo'ladi.

(Yechish).

$$y'=\frac{y}{2}. \Rightarrow \frac{dy}{dx}=\frac{y}{2}. \Rightarrow 2dy=dxy.$$

$$\int\frac{dy}{y}=\int\frac{dx}{2}. \Rightarrow \ln y=\frac{x}{2}+C. \ C\Rightarrow \ln C$$

$$\ln y-\ln C=\frac{x}{2}\ln e. \Rightarrow \ln\left(\frac{y}{C}\right)=\ln e^{\frac{x}{2}}.$$

$$\frac{y}{C}=e^{\frac{x}{2}} \Rightarrow y=Ce^{\frac{x}{2}}. \ \text{Javob; } y=Ce^{\frac{x}{2}}.$$

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ANTARES VY TM* Ω
ABDULAZIZ
RAHIMOV +998972774773

(1996.11.32).

Ushbu $3\sin 2x$ funksiya uchun boshlang'ich funksiyaning umumiy ko'rinishini yozing.

(Yechish).

$3\sin 2x \Rightarrow -\frac{3}{2}\cos 2x + C$. Javob; $-\frac{3}{2}\cos 2x + C$.

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ANTARES VY TM* Ω
ABDULAZIZ
RAHIMOV +998972774773

(1996.10.34).

Ushbu $\oint(x)=1+\frac{1}{\sin^2 4x}$ funksiy boshlang'ich funksiyaning umumiy ko'rinishini topung.

(Yechish).

$1\Rightarrow x.\quad \frac{1}{\sin^2 4x}\Rightarrow -\frac{1}{4}\operatorname{ctg}4x.$

Javob; $x-\frac{1}{4}\operatorname{ctg}4x+C.$

(1996.9.83).

$\oint(x)=1+\frac{1}{\cos^2 4x}$ funksya boshlang'ich funksiyasining umumiy ko'rinishini toping.

(Yechish).

$$1\Rightarrow x\ \frac{1}{\cos^2 4x}\Rightarrow\frac{1}{4}tg4x.$$

Javob; $x+\frac{1}{4}tg4x+C.$

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ABDULAZIZ
RAHIMOV +998972774773

(1996.9.24)

$\oint(x)=-x+\frac{x^2}{2}$ funksiyaning $(6;0)$ nuqtadan o'tuvchi boshlang'ich funksiyani toping.

(Yechish).

$-x \Rightarrow -\frac{x^2}{2}.\quad \frac{x^2}{2} \Rightarrow \frac{x^3}{6}.$

$-\frac{x^2}{2}+\frac{x^3}{6}\pm C.\quad \overset{6;0}{(x;y)}.$

$-\frac{36}{2}+\frac{6^3}{6}\pm C=0. \Rightarrow -18+36\pm C=0.$

$18\pm C=0.\ C\neq 18.\ C=-18.$

$-18+36-18=0.$ Javob; $-\frac{x^2}{2}+\frac{x^3}{6}-18$

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ABDULAZIZ

RAHIMOV +998972774773

(1996.7.32).

$\oint(x)=2\cos^2 x$ funksiya boshlang'ich funksiyasining umumiy ko'rinishini toping.

(Yechish).

$\cos^2 x=\frac{1+\cos 2x}{2}.\quad 2\times\frac{1+\cos 2x}{2}=1+\cos 2x.$

$1\Rightarrow x.\quad \cos 2x\Rightarrow\frac{1}{2}\sin 2x.$

$x+\frac{1}{2}\sin 2x+C.$ Javob; $x+\frac{1}{2}\sin 2x+C.$

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ABDULAZIZ
RAHIMOV +998972774773

(1996.6.48)

Agar $y=\oint(x)$ funksiyaning boshlang'ich funksiyasi $F(x)$ bo'lsa. $2\oint(2x)$ funksiyaning boshlang'ich funksiyasini toping.

(Yechish).

$2\oint(2x) \Rightarrow F(2x)$. Javob; $F(2x)$.

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ABDULAZIZ
RAHIMOV +998972774773

(1996.6.47)

Qiydagi funksiyalarning qaysi biri uchun $F(x)=2\cos x+\sin x+C$ funksiya boshlang'ich funksiya bo'ladi.

(Yechish).

$2\cos x \Rightarrow -2\sin x$. $\sin x \Rightarrow \cos x$.

$-2\sin x+\cos x$ Javob; $-2\sin x+\cos x$.

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ANTARES VY TM*
ABDULAZIZ
RAHIMOV +998972774773

(1996.3.84)

Ushbu $\oint(x)=x^3$ funksiyaning $(2;1)$ nuqtadan o'tuvchi boshlang'ich funksiyani toping.

(Yechish).

$$x^3 \Rightarrow \frac{x^4}{4}\pm C. \quad \overset{2;1}{(x;y)}.$$

$$\frac{16}{4}\pm C=1. \Rightarrow C=1\pm 4.$$

$$C_1=5. \quad C_2=-3.$$

$$\frac{16}{4}+5=9. \Leftrightarrow y=1. \quad \frac{16}{4}-3=1 \Leftrightarrow y=1.$$

Javob; $\frac{x^4}{4}-3.$

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ABDULAZIZ
RAHIMOV +998972774773

(1996.3.35).

Quydagi funksiyalardan qaysi biri $y'=2y$ tenglamaning yechimi bo'ladi?

(Yechish).

$$\frac{dx}{dy}=2y \Rightarrow dy=2dxy. \Rightarrow \int\frac{dy}{y}=\int 2dx.$$

$$\ln y=2x+C.\ C\Rightarrow \ln C.$$

$$\ln y=2x+\ln C. \Rightarrow \ln y-\ln C=2x.$$

$$\ln\left(\frac{y}{c}\right)=2x. \Rightarrow \ln\left(\frac{y}{C}\right)=2x\ln e.$$

$$\frac{y}{C}=e^{2x}. \Rightarrow y=Ce^{2x}.$$ Javob; $y=Ce^{2x}$.

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ANTARES VY TM* Ω
ABDULAZIZ
RAHIMOV +998972774773

(1996.3.31)

Ushbu $2\sin 3x$ funksiya uchun boshlang'ich funksiyaning umumiy ko'rinishini toping.

(Yechish).

$$2\sin 3x \Rightarrow -\frac{2}{3}\cos 3x + C.$$

Javob; $-\frac{2}{3}\cos 3x + C.$

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ANTARES VY TM* Ω
ABDULAZIZ
RAHIMOV +998972774773

(1996.1.32)

Ushbu $\phi(x)=1-\frac{1}{\cos^2 3x}$ funksiyaning boshlang'ich funksiyasining umumiy ko'rinishini toping.

(Yechish).

$$1\Rightarrow x.\quad -\frac{1}{\cos^2 3x}\Rightarrow -\frac{1}{3}tg3x.$$

Javob; $x-\frac{1}{3}tg3x+C.$

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ABDULAZIZ
RAHIMOV +998972774773

(2000.3.70)

Ushbu $\oint(x)=2x-\frac{1}{x^2}-\cos 2x$ funksiyaning boshlang'ich funksiyasini toping.

(Yechish).

$$2x \Rightarrow x^2.\ -\frac{1}{x^2} \Rightarrow \frac{1}{x}.\quad -\cos 2x \Rightarrow \frac{1}{2}\sin 2x.$$

Javob; $x^2+\frac{1}{x}-\frac{1}{2}\sin 2x+C.$