MATEMATIKA 2: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** xxx

IME I PREZIME: JURE DUNDOVIĆ **BROJ INDEKSA:** 17-2-0176-2012

POPUNJAVA NASTAVNIK
Broj ↓ bodova

1. Odredi partikularno rješenje koje zadovoljava navedenu ODJ i uvjete: $y'' + 5y' = 0$, uz $y(0) = 1$ i $y'(0) = 0$. Na kraju provjeri rješenje. 15
2. Pronađi funkciju koja zadovoljava $y\mathrm{d}x + \left(2\sqrt{xy} - x\right)\mathrm{d}y = 0$ i $y(1) = 1$. 15
3. Zadana je funkcija za funkcija $f(x, y) = \sqrt{(x+2)^2 + (y-1)^2} - 3$. Ispitati domenu, kodomenu i razinske krivulje. 15
4. $\displaystyle\int_0^{\pi} \sin(x)\, \mathrm{e}^x \,\mathrm{d}x = ?$ 20
5. $\displaystyle\int_0^{2} \frac{2x^2 + x + 2}{x^2 - 1}\mathrm{d}x = ?$ 15
6. Izračunati površinu lika omeđenog pravcem $y = x + 1$ i parabolom $y = x^2 - x - 2$. 20

Ukupno: 0

f	$\frac{\mathrm{d}f}{\mathrm{d}x}$
$x^\alpha\ (\alpha \neq 0)$	$\alpha x^{\alpha-1}$
$\ln x$	$\frac{1}{x}$
$\log_\alpha x\ (\alpha > 0)$	$\frac{1}{x \ln \alpha}$
e^x	e^x
$\alpha^x\ (\alpha > 0)$	$\alpha^x \ln \alpha$
$\sin x$	$\cos x$
$\cos x$	$-\sin x$
$\tan x$	$\frac{1}{\cos^2 x}$
$\cot x$	$\frac{-1}{\sin^2 x}$
$\arcsin x$	$\frac{1}{\sqrt{1-x^2}}$
$\arctan x$	$\frac{1}{1+x^2}$

Tablica nekih integrala

$\int \mathrm{d}x = x + C$	$\int \frac{\mathrm{d}x}{a^2 + x^2} = \frac{1}{a}\arctan\frac{x}{a} + C$	$\int \frac{\mathrm{d}x}{a^2 - x^2} = \frac{1}{2a}\ln\left\lvert\frac{a+x}{a-x}\right\rvert + C$
$\int x^\alpha \,\mathrm{d}x = \frac{x^{\alpha+1}}{\alpha+1},\ \alpha \neq -1$	$\int \tan x \,\mathrm{d}x = -\ln\lvert\cos x\rvert + C$	$\int \frac{\mathrm{d}x}{x^2 - a^2} = \frac{1}{2a}\ln\left\lvert\frac{x-a}{x+a}\right\rvert + C$
$\int \frac{\mathrm{d}x}{x} = \ln\lvert x\rvert + C$	$\int \cot x \,\mathrm{d}x = \ln\lvert\sin x\rvert + C$	$\int \frac{\mathrm{d}x}{\sqrt{x^2 \pm a^2}} = \ln\left\lvert x + \sqrt{x^2 \pm a^2}\right\rvert + C$
$\int \mathrm{e}^x \,\mathrm{d}x = \mathrm{e}^x + C$	$\int \frac{\mathrm{d}x}{\cos^2 x} = \tan x + C$	$\int \frac{\mathrm{d}x}{\sqrt{a^2 - x^2}} = \arcsin\frac{x}{a} + C$
$\int a^x \,\mathrm{d}x = \frac{a^x}{\ln a} + C$	$\int \frac{\mathrm{d}x}{\sin^2 x} = -\cot x + C$	$\int \frac{\mathrm{d}x}{\sqrt{2ax - x^2}} = \arccos\left(1 - \frac{x}{a}\right) + C$
$\int \sin x \,\mathrm{d}x = -\cos x + C$	$\int \sqrt{x^2 \pm a^2}\,\mathrm{d}x = \frac{1}{2}\left[x\sqrt{x^2 \pm a^2} \pm a^2 \ln\left(x + \sqrt{x^2 \pm a^2}\right)\right] + C$	
$\int \cos x \,\mathrm{d}x = \sin x + C$	$\int \sqrt{a^2 - x^2}\,\mathrm{d}x = \frac{1}{2}\left[x\sqrt{a^2 - x^2} + a^2 \arcsin\left(\frac{x}{a}\right)\right] + C$	

1) $y'' + 5y' = 0$, $y = (0) = 1$, $y'(0) = 0$ → $y' = -5C_2 \cdot e^{-5 \cdot x}$

$y + 5y = 0$

$y = C_1 \cdot e^{0x} + C_2 \cdot e^{-5x}$

$y = C_1 + C_2 e^{-5x}$

$1 = -5C_2$

$k^2 + 5k = 0$

$1 = C_1 + C_2$

$-\frac{1}{5} C_2$

$k(k+5) = 0$

$k = 0$ $\quad$ $k = -5$

$C_1 = 1$

$y = 1 - \frac{1}{5} e^{-5x}$

PROVJERA?

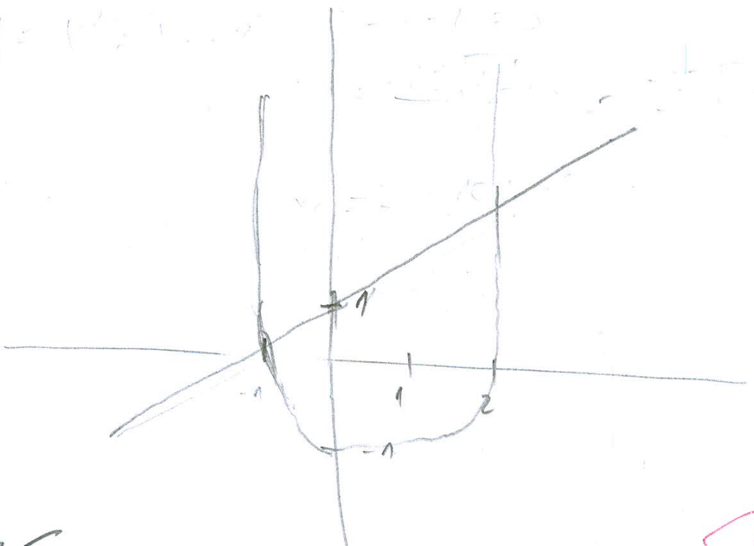
0

6) $y = x+1$

$y = x^2 - x - 2$

$$x_{1,2} = \frac{-1 \pm \sqrt{1-8}}{2}$$

$$x_{1,2} = \frac{-1 \pm 7}{2} \begin{cases} 2 \\ -1 \end{cases}$$ ✗



$$P = \int_{-1}^{2} \left[(x+1) - (x^2 - x - 2) \right] dx = ?$$

4) $$\int_0^{\pi} \sin(x)\, e^x\, dx = \left| \begin{matrix} e^x = u & \sin x = du \\ e^x dx = du & -\cos x = v \end{matrix} \right|$$

$$= -e^x \cos x + \int \cos x\, e^x\, dx = \left| \begin{matrix} e^x = u & \cos x = du \\ e^x dx = du & \sin = v \end{matrix} \right|$$

$$= -e^x \cos x + e^x \operatorname{tg} x - \int e^x \operatorname{tg} x\, dx$$ ∅

$$2I = -e^x \cos x + e^x \operatorname{tg} x \Rightarrow ?$$

$$I = \frac{1}{2} \left(-e^x \cos x + e^x \sin x \right) \Big|_0^{\pi}$$

$$= \frac{1}{2} \left(e^{\pi} \cdot 0 - e^{\pi}(-1) - (0 - e^0 \cdot 1) \right)$$

$$= \frac{1}{2} \left(1 + e^{\pi} \right)$$

ŠTO JE OVO KOLEGA? JESTE LI VI PREPISIVALI S NEKOG IZVORA?

5) $$\int_0^2 \frac{2x^2 + x + 2}{(x-1)(x+1)}$$

$\Downarrow$ 1 $\quad \Downarrow$ -1

$$\frac{2x^2 + x + 2}{(x-1)(x+1)} = \frac{A}{x-1} + \frac{B}{x+1}$$

$$2x^2 + x + 2 = A(x+1) + B(x-1)$$ VIDI RADOVIĆ

$$5 = 2A \Rightarrow A = \frac{5}{2}$$

$$3 = B(-2) \Rightarrow B = \frac{3}{2}$$

$$\frac{5}{2} \int_0^2 \frac{2x}{(x-1)} - \frac{3}{2} \int_0^2 \frac{dx}{x+1} = \frac{5}{2} \ln|x-1| \Big|_0^1 - \frac{3}{2} \ln|x+1| \Big|_0^2$$ ∅

$$= \frac{5}{2} \ln 1 \quad 3 \ln 3 = -\frac{3}{2} \ln 3$$

MATEMATIKA 2: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** xxx
IME I PREZIME: DENI MILETIĆ **BROJ INDEKSA:** 57143

POPUNJAVA NASTAVNIK
Broj ↓ bodova

1. Odredi partikularno rješenje koje zadovoljava navedenu ODJ i uvjete: $y''+5y'=0$, uz $y(0)=1$ i $y'(0)=0$. Na kraju provjeri rješenje. 15
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4. $\int_0^\pi \sin(x)\,e^x\,dx = ?$ 20
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6. Izračunati površinu lika omeđenog pravcem $y=x+1$ i parabolom $y=x^2-x-2$. 20

Ukupno: 0

f	$\frac{df}{dx}$
$x^\alpha\ (\alpha\neq 0)$	$\alpha x^{\alpha-1}$
$\ln x$	$\frac{1}{x}$
$\log_\alpha x\ (\alpha>0)$	$\frac{1}{x\ln\alpha}$
e^x	e^x
$\alpha^x\ (\alpha>0)$	$\alpha^x\ln\alpha$
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Tablica nekih integrala

$\int dx = x+C$	$\int \frac{dx}{a^2+x^2}=\frac{1}{a}\arctan\frac{x}{a}+C$	$\int\frac{dx}{a^2-x^2}=\frac{1}{2a}\ln\left\lvert\frac{a+x}{a-x}\right\rvert+C$
$\int x^\alpha dx=\frac{x^{\alpha+1}}{\alpha+1},\ \alpha\neq-1$	$\int\tan x\,dx=-\ln\lvert\cos x\rvert+C$	$\int\frac{dx}{x^2-a^2}=\frac{1}{2a}\ln\left\lvert\frac{x-a}{x+a}\right\rvert+C$
$\int\frac{dx}{x}=\ln\lvert x\rvert+C$	$\int\cot x\,dx=\ln\lvert\sin x\rvert+C$	$\int\frac{dx}{\sqrt{x^2\pm a^2}}=\ln\left\lvert x+\sqrt{x^2\pm a^2}\right\rvert+C$
$\int e^x dx=e^x+C$	$\int\frac{dx}{\cos^2 x}=\tan x+C$	$\int\frac{dx}{\sqrt{a^2-x^2}}=\arcsin\frac{x}{a}+C$
$\int a^x dx=\frac{a^x}{\ln a}+C$	$\int\frac{dx}{\sin^2 x}=-\cot x+C$	$\int\frac{dx}{\sqrt{2ax-x^2}}=\arccos\left(1-\frac{x}{a}\right)+C$
$\int\sin x\,dx=-\cos x+C$	$\int\sqrt{x^2\pm a^2}\,dx=\frac{1}{2}\left[x\sqrt{x^2\pm a^2}\pm a^2\ln\left(x+\sqrt{x^2\pm a^2}\right)\right]+C$	
$\int\cos x\,dx=\sin x+C$	$\int\sqrt{a^2-x^2}\,dx=\frac{1}{2}\left[x\sqrt{a^2-x^2}+a^2\arcsin\left(\frac{x}{a}\right)\right]+C$	

1. $y''+5y'=0$

$\lambda^2+5\lambda=0$

$\lambda(\lambda+5)=0$

$\lambda_1=0 \quad \lambda_2=-5$

$y(0)=0$

$y'(0)=0$

$y(0)=C_1+C_2\cdot e^{-5\cdot 0}=C_1+C_2 \Rightarrow C_1=-5$

$y'(0)=C_2\cdot e^{-5\cdot 0}-5\cdot e^{-5\cdot 0}=C_2-5$

$C_2=5$

0

$y=C_1\cdot e^{\lambda_1 x}+C_2\cdot e^{\lambda_2 x}$

$y=C_1\cdot e^{0\cdot x}+C_2\cdot e^{-5x}$

$y=C_1+C_2\cdot e^{-5\cdot x}$

$y'=C_2\cdot e^{-5x}-5\cdot e^{-5\cdot x}$

$\sin' = \cos$
$\cos' = -\sin$

4. $\int_0^{\pi} \sin x \cdot e^x \, dx = \left\{ \begin{matrix} u = e^x; \ du = e^x dx \\ dv = \sin x; \ v = -\cos \end{matrix} \right\} =$

$= -\cos x \cdot e^x + \int_0^{\pi} \cos x \, e^x dx = \left\{ \begin{matrix} u = e^x; \ du = e^x dx \\ dv = \cos x; \ v = \sin x \end{matrix} \right\} = -\cos x \cdot e^x + \sin x \cdot e^x - \int_0^{\pi} \sin x \cdot e^x dx$

$\cancel{\int_0^{\pi} \sin x \cdot e^x dx} = [-\cos x \cdot e^x + \sin x \cdot e^x]_0^{\pi} + \cancel{\int_0^{\pi} \sin x \cdot e^x dx}$ $\emptyset$

$0 = [-\cos x \cdot e^x + \sin x \cdot e^x]_0^{\pi} = [-\cos \pi \cdot e^{\pi} + \cancel{\sin \pi}^{0} \cdot e^{\pi}] - [-\cos 0 \cdot e^0 + \cancel{\sin 0}^{0} \cdot e^0]$

$0 = e^{\pi} + 1$

$(\sin x \cdot e^x)' = \cos x \cdot e^x + \sin x \cdot e^x$

5. $\int_0^2 \frac{2x^2 + x + 2}{x^2 - 1} dx =$

$\cancel{2x^2} + x + 2 : x^2 - 1 = 2 + \frac{x+4}{x^2-1}$
$\underline{-\cancel{2x^2} + 2}$
$x + 4$

$= \int_0^2 2dx + \int_0^2 \frac{x+4}{x^2-1} dx = \underbrace{[2x]_0^2}_{I} + \underbrace{\int_0^2 \frac{x+4}{x^2-1} dx}_{II}$

$II = \int_0^2 \frac{x}{x^2-1} dx + \int_0^2 \frac{4}{x^2-1} dx \Rightarrow \int_0^2 \frac{x}{x^2-1} dx = \left\{ \begin{matrix} u = x^2 - 1; \ du = 2x dx \\ x dx = \frac{du}{2} \end{matrix} \right\}$

$= \frac{1}{2} \int_0^2 \frac{du}{u} = \left[\frac{1}{2} \ln |x^2 - 1| \right]_0^2$

OVO JE NEPRAVI INTEGRAL

VIDI RADOVIĆ

$= 4 \int_0^2 \frac{dx}{x^2-1} = \left[\frac{1}{2} \ln \left| \frac{x-1}{x+1} \right| \right]_0^2$

$\Rightarrow \left[2x + \frac{1}{2} \ln |x^2 - 1| + \frac{1}{2} \ln \left| \frac{x-1}{x+1} \right| \right]_0^2 = \left[2 \cdot 2 + \frac{1}{2} \ln |2^2 - 1| + \frac{1}{2} \ln \left| \frac{2-1}{2+2} \right| \right]$

$- \left[2 \cdot \cancel{0}^{0} + \frac{1}{2} \ln |\cancel{0^2}^{0} - 1| + \frac{1}{2} \cancel{\ln} \left| \frac{\cancel{0} - 1}{0 + 1} \right| \right] = 4 + \frac{1}{2} \ln 3 + \frac{1}{2} \ln \frac{1}{4}$

DENI MILETIĆ

6. $\dfrac{y = x}{y = x^2 - x - 2}$ ✗

ZADATAK POGREŠNO PREPISAN

$x^2 - x - 2 = x$

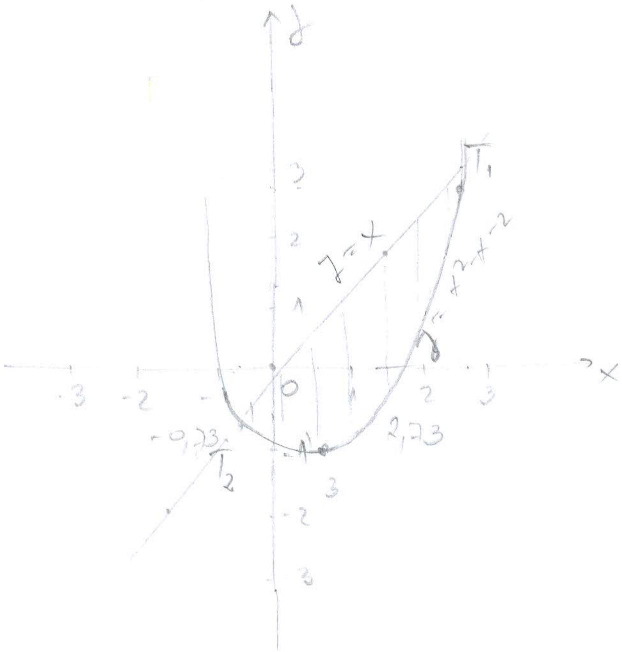
$x^2 - 2x - 2 = 0$

$x_{1,2} = \dfrac{2 \pm \sqrt{4+8}}{2} = \dfrac{2 \pm \sqrt{12}}{2}$

$x_1 = \dfrac{2+2\sqrt{3}}{2}$ $x_2 = \dfrac{2-2\sqrt{3}}{2}$

$y_1 = \dfrac{2+2\sqrt{3}}{2}$ $y_2 = \dfrac{2-2\sqrt{3}}{2}$

$T_1(2{,}73, 2{,}73)$ $T_2 = (-0{,}73, -0{,}73)$



$y = x^2 - x - 2$

$y' = 2x - 1$

$2x - 1 = 0$

$2x = 1$

$x = \dfrac{1}{2}$ $y = \left(\dfrac{1}{2}\right)^2 - \dfrac{1}{2} - 2$

$y = \dfrac{1}{4} - \dfrac{5}{4}$

$y = -1$

$T_3\left(\dfrac{1}{2}, -1\right)$

$y = x$

x	y
-1	-1
0	0
1	1

$P = \int_{-0{,}73}^{2{,}73} (x - x^2 + x + 2)\,dx = \int_{-0{,}73}^{2{,}73} (-x^2 + 2x + 2)\,dx =$

$= \left[-\dfrac{x^3}{3} + 2 \cdot \dfrac{x^2}{2} + 2x \right]_{-0{,}73}^{2{,}73} = \left[-\dfrac{2{,}73^3}{3} + 2{,}73^2 + 2 \cdot 2{,}73 \right] - \left[\dfrac{(-0{,}73)^3}{3} + (-0{,}73)^2 + 2 \cdot (-0{,}73) \right]$

$= [6{,}8 + 7{,}45 + 5{,}46] - [-0{,}13 + 0{,}53 - 1{,}46] \approx 6{,}13 + 1{,}06 \approx 7{,}19$

ZA OVAKAV ZADATAK (KAKO JE PREPISAN) RJEŠENJE JE ≈ 6.93

$$f(x,y) = \sqrt{(x+2)^2 + (y-1)^2} - 3$$

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

?

MATEMATIKA 2: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** xxx

IME I PREZIME: IVAN RADOVIĆ **BROJ INDEKSA:** 57230

POPUNJAVA NASTAVNIK

Broj ↓ bodova

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$\int x^\alpha\,\mathrm{d}x=\frac{x^{\alpha+1}}{\alpha+1},\ \alpha\neq-1$	$\int\tan x\,\mathrm{d}x=-\ln\lvert\cos x\rvert+C$	$\int\frac{\mathrm{d}x}{x^2-a^2}=\frac{1}{2a}\ln\left\lvert\frac{x-a}{x+a}\right\rvert+C$
$\int\frac{\mathrm{d}x}{x}=\ln\lvert x\rvert+C$	$\int\cot x\,\mathrm{d}x=\ln\lvert\sin x\rvert+C$	$\int\frac{\mathrm{d}x}{\sqrt{x^2\pm a^2}}=\ln\left\lvert x+\sqrt{x^2\pm a^2}\right\rvert+C$
$\int\mathrm{e}^x\,\mathrm{d}x=\mathrm{e}^x+C$	$\int\frac{\mathrm{d}x}{\cos^2 x}=\tan x+C$	$\int\frac{\mathrm{d}x}{\sqrt{a^2-x^2}}=\arcsin\frac{x}{a}+C$
$\int a^x\,\mathrm{d}x=\frac{a^x}{\ln a}+C$	$\int\frac{\mathrm{d}x}{\sin^2 x}=-\cot x+C$	$\int\frac{\mathrm{d}x}{\sqrt{2ax-x^2}}=\arccos\left(1-\frac{x}{a}\right)+C$
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4. $$\int_0^\pi \sin x\, e^x\,dx = \int u\cdot dv\,dx = uv-\int v\cdot du = \left[\begin{matrix} u=\sin x & dv = e^x dx \,/\!\int \\ du=\cos x & v=e^x\end{matrix}\right]$$

$$= \sin x\cdot e^x\Big|_0^\pi - \int_0^\pi e^x\cdot\cos x = (\sin\pi-\sin 0)\cdot(e^\pi-e^0)-\int_0^\pi e^x\cdot\cos x$$

$$=(e^\pi-e^0)-\int_0^\pi e^x\cdot\cos x\,dx \left[\begin{matrix} u=\cos x & dv=e^x \,/\!\int \\ du=-\sin x & v=e^x\end{matrix}\right]$$

$$=(e^\pi-e^0)-\left(\cos x\cdot e^x\right)\Big|_0^\pi-\int e^x\cdot(-\sin x)$$

$$=(e^\pi-e^0)-2-$$

?

$\cancel{0}$

$$\int_0^2 \frac{2x^2+x+2}{x^2-1}$$

$$2x^2+x+2 : x^2-1 = 2 - \frac{x+4}{x^2-1}$$

$$\frac{\ominus 2x^2 \oplus 2}{x+4}$$

$$\int_0^2 2-\frac{x+4}{x^2-1}dx = \int_0^2 2dx - \int_0^2 \frac{x+4}{x^2-1}dx$$

$$\boxed{\begin{matrix} x-1=t \\ dx=dt \end{matrix}}$$

$$= 2x - \int_0^2 \frac{x+4}{x^2-1}dx$$

$$= 2x - \int_0^2 \frac{x\,dx}{x^2-1} + \int_0^2 \frac{4\,dx}{x^2-1^2}$$

OVO JE NEPRAVI INTEGRAL

NEWTON-LEIBNITZOVA FORMULA NE VRIJEDI KOD PREKIDA FUNKCIJE NA PODRUČJU INTEGRACIJE

$$= 2x\Big|_0^2 - \int_0^2 \frac{x\,dx}{x^2-1} + 4\cdot\frac{1}{2x}\ln\left(\frac{x+1}{x-1}\right)\Bigg|_0^2 = 2x\Big|_0^2 - \int_0^2 \frac{x\,dx}{(x-1)}\cdot\int_0^2 \frac{dx}{(x-1)} + \frac{4}{2x}\ln\left(\frac{x+1}{x-1}\right)$$

$$= 2x\Big|_0^2 - \int_0^2 \frac{dt}{t}\cdot\ln|x-1|\Big|_0^2 + \frac{4}{2x}\ln\left(\frac{x+1}{x-1}\right)\Bigg|_0^2 = 2x\Big|_0^2 - \ln|x-1|\Big|_0^2\cdot\ln|x-1|\Big|_0^2 + 4\ln\left(\frac{x+1}{x-1}\right)\Bigg|_0^2$$

$$= 4 - 0\cdot 0 + 4.394449 = 8.39444\,9155$$

0

$y_1 = x+1$

$y_2 = x^2-x-2$

$x=2$

$y_1 = 3+1 = 4$

$y_2 = 0$

$$x^2-x-2 = x+1$$

$$x^2-2x-3=0$$

$$\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

$$\frac{2\pm\sqrt{4+12}}{2} = \frac{2\pm\sqrt{16}}{2}$$

$$x_1 = \frac{2-\sqrt{16}}{2} \qquad x_2 = \frac{2+\sqrt{16}}{2}$$

$$x_1 = \frac{2-4}{2} \qquad x_2 = \frac{2+4}{2}$$

$$x_1 = -1 \qquad x_2 = 3$$

$$P = \int_{-1}^{3} x+1\,dx \int_{-1}^{3} x^2-x-2\,dx = \left(\frac{x^2}{2}+x\right)\Bigg|_{-1}^{3} - \left(\frac{x^3}{3}-\frac{x^2}{2}-2x\right)\Bigg|_{-1}^{3} = (6+0.5) - (-6-1.166666)$$

$$P = 6.5 + 7.166666 = 13.66666$$

15

MATEMATIKA 2: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** xxx

IME I PREZIME: LUKA KNEŽEVIĆ **BROJ INDEKSA:** 17-2-1120-2011

POPUNJAVA NASTAVNIK
Broj ↓ bodova

1. Odredi partikularno rješenje koje zadovoljava navedenu ODJ i uvjete: $y''+5y'=0$, uz $y(0)=1$ i $y'(0)=0$. Na kraju provjeri rješenje. 15
2. Pronađi funkciju koja zadovoljava $ydx+\left(2\sqrt{xy}-x\right)dy=0$ i $y(1)=1$. 15
3. Zadana je funkcija za funkcija $f(x,y)=\sqrt{(x+2)^2+(y-1)^2}-3$. Ispitati domenu, kodomenu i razinske krivulje. 15
4. $\int_0^\pi \sin(x)\,e^x\,dx=?$ 20
5. $\int_0^2 \frac{2x^2+x+2}{x^2-1}dx=?$ ~~15~~
6. Izračunati površinu lika omeđenog pravcem $y=x+1$ i parabolom $y=x^2-x-2$. 20

Ukupno: 40

f	$\frac{df}{dx}$
$x^\alpha\ (\alpha\neq 0)$	$\alpha x^{\alpha-1}$
$\ln x$	$\frac{1}{x}$
$\log_\alpha x\ (\alpha>0)$	$\frac{1}{x\ln\alpha}$
e^x	e^x
$\alpha^x\ (\alpha>0)$	$\alpha^x\ln\alpha$
$\sin x$	$\cos x$
$\cos x$	$-\sin x$
$\tan x$	$\frac{1}{\cos^2 x}$
$\cot x$	$\frac{-1}{\sin^2 x}$
$\arcsin x$	$\frac{1}{\sqrt{1-x^2}}$
$\arctan x$	$\frac{1}{1+x^2}$

Tablica nekih integrala		
$\int dx=x+C$	$\int\frac{dx}{a^2+x^2}=\frac{1}{a}\arctan\frac{x}{a}+C$	$\int\frac{dx}{a^2-x^2}=\frac{1}{2a}\ln\left\|\frac{a+x}{a-x}\right\|+C$
$\int x^\alpha dx=\frac{x^{\alpha+1}}{\alpha+1},\ \alpha\neq-1$	$\int\tan x\,dx=-\ln\|\cos x\|+C$	$\int\frac{dx}{x^2-a^2}=\frac{1}{2a}\ln\left\|\frac{x-a}{x+a}\right\|+C$
$\int\frac{dx}{x}=\ln\|x\|+C$	$\int\cot x\,dx=\ln\|\sin x\|+C$	$\int\frac{dx}{\sqrt{x^2\pm a^2}}=\ln\left\|x+\sqrt{x^2\pm a^2}\right\|+C$
$\int e^x dx=e^x+C$	$\int\frac{dx}{\cos^2 x}=\tan x+C$	$\int\frac{dx}{\sqrt{a^2-x^2}}=\arcsin\frac{x}{a}+C$
$\int a^x dx=\frac{a^x}{\ln a}+C$	$\int\frac{dx}{\sin^2 x}=-\cot x+C$	$\int\frac{dx}{\sqrt{2ax-x^2}}=\arccos\left(1-\frac{x}{a}\right)+C$
$\int\sin x\,dx=-\cos x+C$	$\int\sqrt{x^2\pm a^2}\,dx=\frac{1}{2}\left[x\sqrt{x^2\pm a^2}\pm a^2\ln\left(x+\sqrt{x^2\pm a^2}\right)\right]+C$	
$\int\cos x\,dx=\sin x+C$	$\int\sqrt{a^2-x^2}\,dx=\frac{1}{2}\left[x\sqrt{a^2-x^2}+a^2\arcsin\left(\frac{x}{a}\right)\right]+C$	

4) $\int_0^\pi \sin(x)e^x dx$

$\sin x=u \qquad e^x dx=dv$
$\cos x=du \qquad e^x=v$

$\sin x\cdot e^x-\int e^x\cos x\,dx$

$\cos x=u \qquad e^x dx=dv$
$-\sin x=du \qquad e^x=v$

$\int_0^\pi \sin(x)e^x dx=\sin x\cdot e^x-\left(\cos x\cdot e^x+\int_0^\pi \sin x\cdot e^x dx\right)$

$\int_0^\pi \sin(x)e^x dx=\sin x\cdot e^x-\cos x\cdot e^x-\int_0^\pi \sin x\cdot e^x dx$

$2\int_0^\pi \sin x\cdot e^x dx=\sin x\cdot e^x-\cos x\cdot e^x$

$\int_0^\pi \sin x\cdot e^x dx=\left[\frac{\sin x\cdot e^x-\cos x\cdot e^x}{2}\right]_0^\pi=\frac{\underbrace{\sin\pi}_{=0}\cdot e^\pi-\underbrace{\cos\pi}_{=-1}\cdot e^\pi}{2}-\frac{\underbrace{\sin 0}_{0}\cdot \underbrace{e^0}_{}-\underbrace{\cos 0}_{1}\cdot e^0}{2}$

$=-10.9188+\frac{1}{2}=-10.4188$

✓ 20

(5) $\int_0^2 \frac{2x^2+x+2}{x^2-1}$

$2x^2+x+2 : x^2-1 = 2 + \frac{x+4}{x^2-1}$

$-\;\underline{2x^2 \quad -2}$

$x+4$

$\int_0^2 2 + \frac{\cancel{0}}{x+1} + \frac{4}{x-1}$

$x^2-1=0$

$x_1 = 1 \quad x_2 = -1$

$\int_0^2 2 + \frac{4}{x-1}$

FUNKCIJA NIJE NEPREKIDNA NA PODRUČJU INTEGRACIJE PA NE VRIJEDI N-L FORMULA

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

$\Big|_0^2 2x + 4\ln|x-1| = 4 - 0 = 4$ ✗

OVO JE NEPRAVI INTEGRAL KOJI DIVERGIRA

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

$x+4 = Ax - A + Bx + B$

$A = x - B \quad B = x - A$

$x = A + B$

$4 = -A + B \Rightarrow \quad B = 4 + A$

$A = B + 4$

$x = 2A + 4$

$x = 2B + 4$

$x = 4$

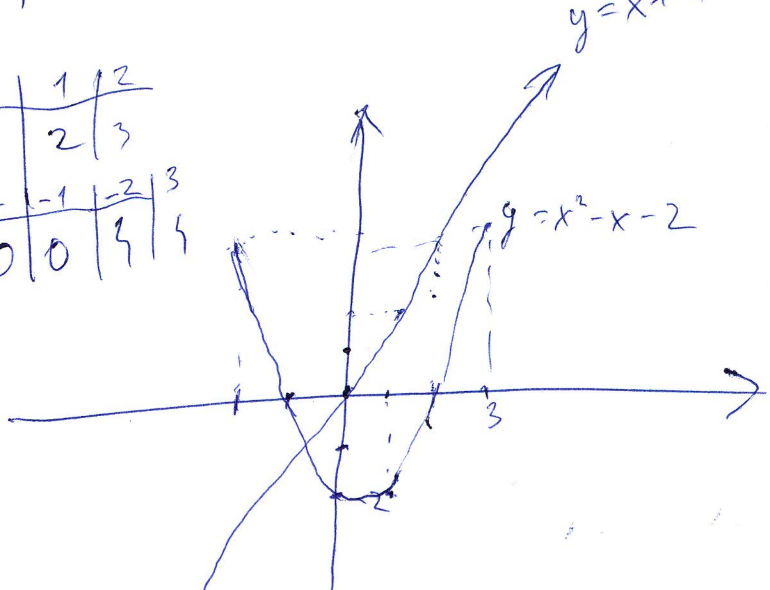
$4 = 4 - 2A \quad /:2$

$A = 0 \quad B = 4$

(6) $y = x+1 \qquad y = x^2 - x - 2$

x	0	1	2
y	1	2	3

x	0	1	2	-1	-2	3
y	-2	-2	0	0	4	4



$x+1 = x^2 - x - 2$

$-x^2 + 2x + 3 = 0$

$x^2 - 2x - 3 = 0$

$x = \frac{2 \mp \sqrt{4+12}}{2}$

$x_1 = \frac{2-4}{2} = -1$ ✓

$x_2 = \frac{2+4}{2} = 3$ ✓

$\int_{-1}^{3} x+1 - x^2 + x + 2 = \int_{-1}^{3} -x^2 + 2x + 3$ ✓

$= \Big|_{-1}^{3} -\frac{x^3}{3} + 2\frac{x^2}{2} + 3x = \Big|_{-1}^{3} -\frac{x^3}{3} + x^2 + 3x = -9 + 9 + 9 - \left(+\frac{1}{3} + 1 - 3\right)$ ✓✓✓✓✓✓

$= 9 + \frac{5}{3}$

$= \frac{32}{3} = 10.6666667$ ✓

(3) $\sqrt{(x+2)^2 + (y-1)^2} - 3$

$x + 2 + y - 1 - 3 = 0$

$x + y = 2$

$Df \in \mathbb{R}$

MATEMATIKA 2: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** xxx	POPUNJAVA NASTAVNIK
IME I PREZIME: MARTIN ŠOŠA **BROJ INDEKSA:** 17-1-0097-2011	Broj ↓ bodova

1. Odredi partikularno rješenje koje zadovoljava navedenu ODJ i uvjete: $y'' + 5y' = 0$, uz $y(0) = 1$ i $y'(0) = 0$. Na kraju provjeri rješenje. 15
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Ukupno: 0

f	$\frac{df}{dx}$
$x^\alpha\ (\alpha \neq 0)$	$\alpha x^{\alpha-1}$
$\ln x$	$\frac{1}{x}$
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Tablica nekih integrala

$\int dx = x + C$	$\int \frac{dx}{a^2 + x^2} = \frac{1}{a} \arctan \frac{x}{a} + C$	$\int \frac{dx}{a^2 - x^2} = \frac{1}{2a} \ln \left\lvert \frac{a+x}{a-x} \right\rvert + C$
$\int x^\alpha dx = \frac{x^{\alpha+1}}{\alpha+1},\ \alpha \neq -1$	$\int \tan x\, dx = -\ln\lvert\cos x\rvert + C$	$\int \frac{dx}{x^2 - a^2} = \frac{1}{2a} \ln \left\lvert \frac{x-a}{x+a} \right\rvert + C$
$\int \frac{dx}{x} = \ln\lvert x\rvert + C$	$\int \cot x\, dx = \ln\lvert\sin x\rvert + C$	$\int \frac{dx}{\sqrt{x^2 \pm a^2}} = \ln\left\lvert x + \sqrt{x^2 \pm a^2}\right\rvert + C$
$\int e^x dx = e^x + C$	$\int \frac{dx}{\cos^2 x} = \tan x + C$	$\int \frac{dx}{\sqrt{a^2 - x^2}} = \arcsin \frac{x}{a} + C$
$\int a^x dx = \frac{a^x}{\ln a} + C$	$\int \frac{dx}{\sin^2 x} = -\cot x + C$	$\int \frac{dx}{\sqrt{2ax - x^2}} = \arccos\left(1 - \frac{x}{a}\right) + C$
$\int \sin x\, dx = -\cos x + C$	$\int \sqrt{x^2 \pm a^2}\, dx = \frac{1}{2}\left[x\sqrt{x^2 \pm a^2} \pm a^2 \ln\left(x + \sqrt{x^2 \pm a^2}\right)\right] + C$	
$\int \cos x\, dx = \sin x + C$	$\int \sqrt{a^2 - x^2}\, dx = \frac{1}{2}\left[x\sqrt{a^2 - x^2} + a^2 \arcsin\left(\frac{x}{a}\right)\right] + C$	

4. $\int_0^{\pi} \sin(x)\, e^x\, dx =$

5. $\int_0^{2} \frac{2x^2 + x + 2}{x^2 - 1} dx =$

(2.) $y\,dx + (2\sqrt{xy} - x) = 0 \qquad y(1) = 1$

MATEMATIKA 2: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** xxx

IME I PREZIME: MARIO IVANAC **BROJ INDEKSA:** 17-1-0096-2011

POPUNJAVA NASTAVNIK

Broj ↓ bodova

1. Odredi partikularno rješenje koje zadovoljava navedenu ODJ i uvjete: $y''+5y'=0$, uz $y(0)=1$ i $y'(0)=0$. Na kraju provjeri rješenje. 15
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Ukupno: 0

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$x^\alpha\ (\alpha\neq 0)$	$\alpha x^{\alpha-1}$
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$\cot x$	$\frac{-1}{\sin^2 x}$
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Tablica nekih integrala

$\int dx=x+C$	$\int\frac{dx}{a^2+x^2}=\frac{1}{a}\arctan\frac{x}{a}+C$	$\int\frac{dx}{a^2-x^2}=\frac{1}{2a}\ln\left\lvert\frac{a+x}{a-x}\right\rvert+C$
$\int x^\alpha dx=\frac{x^{\alpha+1}}{\alpha+1},\ \alpha\neq-1$	$\int\tan x\,dx=-\ln\lvert\cos x\rvert+C$	$\int\frac{dx}{x^2-a^2}=\frac{1}{2a}\ln\left\lvert\frac{x-a}{x+a}\right\rvert+C$
$\int\frac{dx}{x}=\ln\lvert x\rvert+C$	$\int\cot x\,dx=\ln\lvert\sin x\rvert+C$	$\int\frac{dx}{\sqrt{x^2\pm a^2}}=\ln\left\lvert x+\sqrt{x^2\pm a^2}\right\rvert+C$
$\int e^x dx=e^x+C$	$\int\frac{dx}{\cos^2 x}=\tan x+C$	$\int\frac{dx}{\sqrt{a^2-x^2}}=\arcsin\frac{x}{a}+C$
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$\int\cos x\,dx=\sin x+C$	$\int\sqrt{a^2-x^2}\,dx=\frac{1}{2}\left[x\sqrt{a^2-x^2}+a^2\arcsin\left(\frac{x}{a}\right)\right]+C$	

6) $y=x^2-x-2$

$y=x+1$ ——> $y_1=-1+1$ $\quad y_2=x_2+1$

$y_1=0 \quad y_2=3+1$

$S_1(-1,0) \quad y_2=4$

$S_2(3,4)$

$x^2-x-2=x+1$

$x^2-x-2-x-1=0$

$x^2-2x-3=0$

$x_{1,2}=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

$x_{1,2}=\frac{2\pm\sqrt{4-4\cdot1(-3)}}{2\cdot1}$

$x_{1,2}=\frac{2\pm4}{2}$

$x_1=-1$ ✓

$x_2=3$ ✓

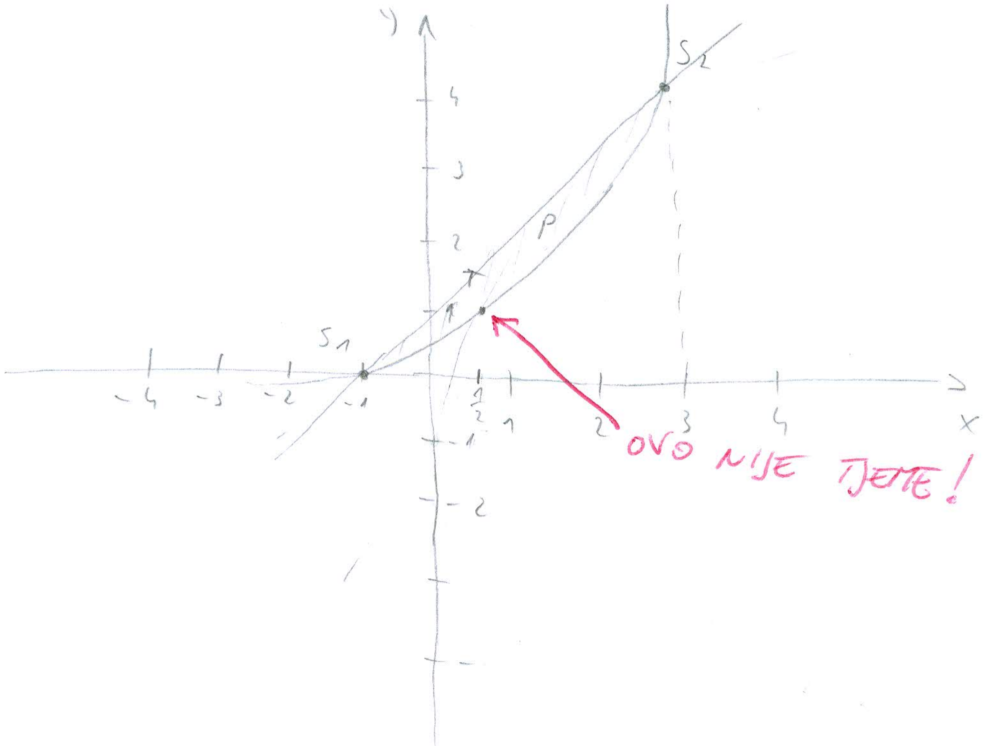
Tjeme:

$y=x^2-x-2$

$x_0=-\frac{b}{2a}=-\frac{(-1)}{2\cdot1}=\frac{1}{2}$

$y_0=\frac{4ac-b^2}{2a}=\frac{4\cdot1\cdot(-2)}{2\cdot1}=\frac{2}{2}=1$

$T\left(\frac{1}{2},1\right)$



$$P = \int_{-1}^{3} \left((x^2 - x - 2) - (x + 1) \right) dx$$

$$P = \int_{-1}^{3} (x^2 - x - 2 - x - 1)\, dx$$

$$P = \int_{-1}^{3} (x^2 - 2x - 3)\, dx$$

$$P = \frac{x^3}{3} - x^2 - 3x \Big|_{-1}^{3}$$

$$P = \left(\frac{(-1)^3}{3} - (-1)^2 - 3 \cdot (-1) \right) - \left(\frac{3^3}{3} - 3^2 - 3 \cdot 3 \right)$$

$$P = \left(-\frac{1}{3} + 1 + 3 \right) - \left(\frac{\cancel{27}^{9}}{\cancel{3}_{1}} - 9 - 9 \right)$$

$$P = \frac{11}{3} + 9$$

$$P = \frac{38}{3}$$

MARIO IVANAC

3) $f(x,y) = \sqrt{(x+2)^2+(y-1)^2} - 3$

Domena:

$(x+2)^2+(y-1)^2-3 \geq 0$

$4x^2+16x+y^2+2y-3 \geq 0$

$4x^2+16x+y^2+2y \geq 0$

$Df: \{(x,y) \in R \mid 4x^2+16x+y^2+2y \geq 0\}$ $\emptyset$

$D_f = \mathbb{R} \times \mathbb{R}$

4) $\int_0^{\pi} \sin(x) e^x dx = \begin{cases} v = e^x & u = \sin x\, dx \\ v' = e^x & du = \int \sin x\, dx \\ & du = -\cos x \end{cases}$

$u \cdot v - \int v\, du = \sin x \cdot e^x - \int e^x \cdot (-\cos x)$

$= \sin x e^x - \sin x e^x$ × $\emptyset$

$= 0$

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IME I PREZIME: IVAN VELEMIR **BROJ INDEKSA:** 1~~7~~-2-0067-2010

POPUNJAVA NASTAVNIK

Broj ↓ bodova

1. Odredi partikularno rješenje koje zadovoljava navedenu ODJ i uvjete: $y''+5y'=0$, uz $y(0)=1$ i $y'(0)=0$. Na kraju provjeri rješenje. 15
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Ukupno: $\emptyset$

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$x^\alpha\ (\alpha\neq 0)$	$\alpha x^{\alpha-1}$
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$\int x^\alpha\,\mathrm{d}x=\frac{x^{\alpha+1}}{\alpha+1},\ \alpha\neq-1$	$\int\tan x\,\mathrm{d}x=-\ln\|\cos x\|+C$	$\int\frac{\mathrm{d}x}{x^2-a^2}=\frac{1}{2a}\ln\left\|\frac{x-a}{x+a}\right\|+C$
$\int\frac{\mathrm{d}x}{x}=\ln\|x\|+C$	$\int\cot x\,\mathrm{d}x=\ln\|\sin x\|+C$	$\int\frac{\mathrm{d}x}{\sqrt{x^2\pm a^2}}=\ln\left\|x+\sqrt{x^2\pm a^2}\right\|+C$
$\int\mathrm{e}^x\,\mathrm{d}x=\mathrm{e}^x+C$	$\int\frac{\mathrm{d}x}{\cos^2 x}=\tan x+C$	$\int\frac{\mathrm{d}x}{\sqrt{a^2-x^2}}=\arcsin\frac{x}{a}+C$
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IME I PREZIME: MARKO GAMBIRAŽA **BROJ INDEKSA:** 57827

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$\int x^\alpha\,\mathrm{d}x=\frac{x^{\alpha+1}}{\alpha+1},\ \alpha\neq-1$	$\int\tan x\,\mathrm{d}x=-\ln\|\cos x\|+C$	$\int\frac{\mathrm{d}x}{x^2-a^2}=\frac{1}{2a}\ln\left\|\frac{x-a}{x+a}\right\|+C$
$\int\frac{\mathrm{d}x}{x}=\ln\|x\|+C$	$\int\cot x\,\mathrm{d}x=\ln\|\sin x\|+C$	$\int\frac{\mathrm{d}x}{\sqrt{x^2\pm a^2}}=\ln\left\|x+\sqrt{x^2\pm a^2}\right\|+C$
$\int\mathrm{e}^x\,\mathrm{d}x=\mathrm{e}^x+C$	$\int\frac{\mathrm{d}x}{\cos^2 x}=\tan x+C$	$\int\frac{\mathrm{d}x}{\sqrt{a^2-x^2}}=\arcsin\frac{x}{a}+C$
$\int a^x\,\mathrm{d}x=\frac{a^x}{\ln a}+C$	$\int\frac{\mathrm{d}x}{\sin^2 x}=-\cot x+C$	$\int\frac{\mathrm{d}x}{\sqrt{2ax-x^2}}=\arccos\left(1-\frac{x}{a}\right)+C$
$\int\sin x\,\mathrm{d}x=-\cos x+C$	$\int\sqrt{x^2\pm a^2}\,\mathrm{d}x=\frac{1}{2}\left[x\sqrt{x^2\pm a^2}\pm a^2\ln\left(x+\sqrt{x^2\pm a^2}\right)\right]+C$	
$\int\cos x\,\mathrm{d}x=\sin x+C$	$\int\sqrt{a^2-x^2}\,\mathrm{d}x=\frac{1}{2}\left[x\sqrt{a^2-x^2}+a^2\arcsin\left(\frac{x}{a}\right)\right]+C$	

① $y''+5y'=0$ $\quad y(0)=1$ $\quad y'(0)=0$