MATEMATIKA 3: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** Obavezno popuniti sva polja ispod⇊

IME I PREZIME: DINO KURIĆ **BROJ INDEKSA:** 56192-2008

VRIJEME POČETKA: **VRIJEME ZAVRŠETKA:**

POPUNJAVA NASTAVNIK

Broj ↓ bodova

1. Zadan trokut T sa vrhovima: $A(1,1)$, $B(2,3)$ i $C(3,2)$ i funkcija $f(x,y)=xy$. Odrediti $\displaystyle\iint_T f(x,y)\,dxdy$. 20
2. Neka je K krug radijusa $r=1$ sa centrom u točki $T(2,1)$. Izračunati $\displaystyle\iint_K (3-2y)\,dxdy$. 20
3. Provjeriti da li je krivuljni integral u vektorskom polju $g(x,y,z)=(2x-1,\,3y+z,\,2z+y)$ neovisan o putu, odnosno da li zavisi samo od početne i završne točke? 20
4. Neka je K kocka stranice duljine $a=2$ centrirana u ishodištu. Izračunati $\displaystyle\iint_{\partial K} (2+3y)\,dxdy$. 20
5. Koristeći Laplaceovu transformaciju riješiti diferencijalnu jednadžbu: 20

$$f'''(t)-f'(t)=\cos(t)\,,\quad f(0)=1,\ f'(0)=f''(0)=0.$$

Ukupno:

Tablica integrala

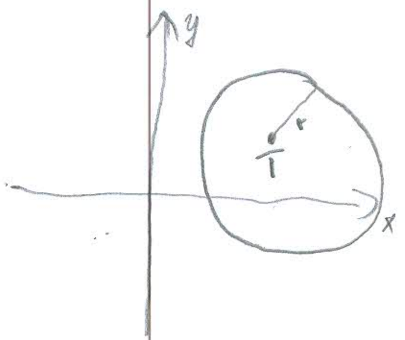
$\int dx = x + C$	$\int \frac{dx}{\cos^2 x} = \tan x + C$	$\int \frac{dx}{a^2+x^2} = \frac{1}{a}\arctan\frac{x}{a} + C$
$\int x^n\,dx = \frac{x^{n+1}}{n+1},\ n\neq -1$	$\int \frac{dx}{\sin^2 x} = -\cot x + C$	$\int \frac{dx}{a^2-x^2} = \frac{1}{2a}\ln\left\lvert\frac{a+x}{a-x}\right\rvert + C$
$\int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

Tablica Laplaceovih transformacija:

$f(t)$	$F(s)=\mathcal{L}[f](s)$	$f(t)$	$F(s)=\mathcal{L}[f](s)$
1	$\frac{1}{s}$	$\sinh(at)$	$\frac{a}{s^2-a^2}$
c	$\frac{c}{s}$	$\cosh(at)$	$\frac{s}{s^2-a^2}$
t	$\frac{1}{s^2}$	$e^{-at}f(t)$	$F(s+a)$
t^n	$\frac{n!}{s^{n+1}}$	$f(at)$	$\frac{1}{a}F(\frac{s}{a})$
$\frac{1}{\sqrt{\pi t}}$	$\frac{1}{\sqrt{s}}$	$t^n f(t)$	$(-1)^n F^{(n)}(s)$
e^{-at}	$\frac{1}{s+a}$	$\frac{f(t)}{t}$	$\int_s^\infty F(q)\,dq$
$t\,e^{-at}$	$\frac{1}{(s+a)^2}$	$\int_0^t f(\tau)\,d\tau$	$\frac{F(s)}{s}$
$(1-at)\,e^{-at}$	$\frac{s}{(s+a)^2}$	$f'(t)$	$sF(s)-f(0)$
$\sin(at)$	$\frac{a}{s^2+a^2}$	$f''(t)$	$s^2F(s)-sf(0)-f'(0)$
$\cos(at)$	$\frac{s}{s^2+a^2}$	$f'''(t)$	$s^3F(s)-s^2f(0)-sf'(0)-f''(0)$

Ime i prezime: Dino Kurić   Broj indeksa: 56192-2008

2. $r = 1 \quad T(2,1); \quad \iint_K (3-2y)\,dx\,dy =$



Polarne koordinate

$x = r\cos\varphi + 2$

$y = r\sin\varphi + 1$

$r \in (0,1)$

$\varphi \in (0, 2\pi)$

$$\int_0^{2\pi} d\varphi \int_0^1 (3 - 2r\sin\varphi + 1)\, r\,dr\,d\varphi$$ ✗ ∅

$$\int_0^{2\pi} d\varphi \cdot 4\int_0 -2r\sin\varphi\, r\,dr$$

$$\int_0^{2\pi} \sin\varphi\, d\varphi \cdot 4 \int -2r\cdot r\,dr$$

$$-\cos\varphi\Big|_0^{2\pi} \cdot 4\cdot(-2)\cdot \int_0^1 r^2\,dr$$

$$= -\cos 2\pi\Big|_0^{2\pi} - 8\,\frac{r^3}{3}\Big|_0^1$$ 0,33

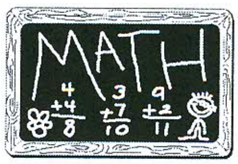
$$= -\cos 2\pi\Big|_0^{2} - 8\cdot\frac{1}{3}\Big|_0^1$$

$$= -(\cos 2\pi + \cos 0)\Big|_0^{2\pi} - 8\cdot\frac{1}{3}$$

$= -1 + \ldots$

$= -0,$

ZADATKE RIJEŠAVATE JEDNOSTRANO NA OVOM PAPIRU, ALI NA DRUGOJ STRANI. NA OVOJ STRANI MOŽETE PISATI, ALI SVE ŠTO OVDJE NAPIŠETE NEĆE VAM BITI PREGLEDANO NITI OCIJENJENO.



MATEMATIKA 3: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** Obavezno popuniti sva polja ispod⇊

IME I PREZIME: Igor Brajica **BROJ INDEKSA:** 52803-2005

VRIJEME POČETKA: **VRIJEME ZAVRŠETKA:**

POPUNJAVA NASTAVNIK
Broj ↓ bodova

1. Zadan trokut T sa vrhovima: $A(1,1)$, $B(2,3)$ i $C(3,2)$ i funkcija $f(x,y) = xy$. Odrediti $\iint_T f(x,y)\mathrm{d}x\mathrm{d}y$. 20
2. Neka je K krug radijusa $r = 1$ sa centrom u točki $T(2,1)$. Izračunati $\iint_K (3-2y)\,\mathrm{d}x\mathrm{d}y$. 20
3. Provjeriti da li je krivuljni integral u vektorskom polju $g(x,y,z) = (2x-1,\, 3y+z,\, 2z+y)$ neovisan o putu, odnosno da li zavisi samo od početne i završne točke? 20
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$$f'''(t) - f'(t) = \cos(t), \quad f(0) = 1,\ f'(0) = f''(0) = 0.$$

Ukupno: 0

Tablica integrala

$\int \mathrm{d}x = x + C$	$\int \frac{\mathrm{d}x}{\cos^2 x} = \tan x + C$	$\int \frac{\mathrm{d}x}{a^2+x^2} = \frac{1}{a}\arctan\frac{x}{a} + C$
$\int x^n\,\mathrm{d}x = \frac{x^{n+1}}{n+1},\ n \neq -1$	$\int \frac{\mathrm{d}x}{\sin^2 x} = -\cot x + C$	$\int \frac{\mathrm{d}x}{a^2-x^2} = \frac{1}{2a}\ln\left\lvert\frac{a+x}{a-x}\right\rvert + C$
$\int \frac{\mathrm{d}x}{x} = \ln\lvert x\rvert + C$	$\int \sinh x\,\mathrm{d}x = \cosh x + C$	$\int \frac{\mathrm{d}x}{x^2-a^2} = \frac{1}{2a}\ln\left\lvert\frac{x-a}{x+a}\right\rvert + C$
$\int a^x\,\mathrm{d}x = \frac{a^x}{\ln a} + C$	$\int \cosh x\,\mathrm{d}x = \sinh x + C$	$\int \frac{\mathrm{d}x}{\sqrt{x^2\pm a^2}} = \ln\left\lvert x + \sqrt{x^2\pm a^2}\right\rvert + C$
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Tablica

Laplaceovih transformacija:

$f(t)$	$F(s) = \mathcal{L}[f](s)$	$f(t)$	$F(s) = \mathcal{L}[f](s)$
1	$\frac{1}{s}$	$\sinh(at)$	$\frac{a}{s^2-a^2}$
c	$\frac{c}{s}$	$\cosh(at)$	$\frac{s}{s^2-a^2}$
t	$\frac{1}{s^2}$	$e^{-at}f(t)$	$F(s+a)$
t^n	$\frac{n!}{s^{n+1}}$	$f(at)$	$\frac{1}{a}F(\frac{s}{a})$
$\frac{1}{\sqrt{\pi t}}$	$\frac{1}{\sqrt{s}}$	$t^n f(t)$	$(-1)^n F^{(n)}(s)$
e^{-at}	$\frac{1}{s+a}$	$\frac{f(t)}{t}$	$\int_s^\infty F(q)\,\mathrm{d}q$
$t\,e^{-at}$	$\frac{1}{(s+a)^2}$	$\int_0^t f(\tau)\,\mathrm{d}\tau$	$\frac{F(s)}{s}$
$(1-at)e^{-at}$	$\frac{s}{(s+a)^2}$	$f'(t)$	$sF(s) - f(0)$
$\sin(at)$	$\frac{a}{s^2+a^2}$	$f''(t)$	$s^2F(s) - sf(0) - f'(0)$
$\cos(at)$	$\frac{s}{s^2+a^2}$	$f'''(t)$	$s^3F(s) - s^2f(0) - sf'(0) - f''(0)$

IME I PREZIME: Igor Brajica

BROJ INDEKSA: 52803-2005

(5) $f'''(t) - f'(t) = \cos(t)$

$f(0) = 1$

$f'(0) = 0$

$f''(0) = 0$

$$s^3F(s) - s^2\cancel{f(0)} - s\cancel{f'(0)} - \cancel{f''(0)} - sF(s) - \cancel{f(0)} = \frac{s}{s^2+1}$$

$$s^3F(s) - s^2 - sF(s) - 1 = \frac{s}{s^2+1}$$

$$F(s)(s^3 - s) = \frac{s}{s^2+1} + s^2 + 1$$

$$F(s)(s^3 - s) = \frac{s + s^4 + s^2 + s^2 + 1}{s^2+1}$$

$$F(s)(s^3 - s) = \frac{s^4 + 2s^2 + s + 1}{(s^2+1)(s^3-s)}$$

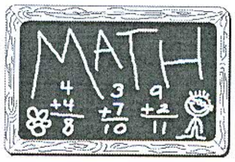
$$F(s) = \frac{s^4 + 2s^2 + s + 1}{s(s^2-1)(s^2+1)}$$

$$F(s) = \frac{s^4 + 2s^2 + s + 1}{s(s-1)(s+1)(s^2+1)} =$$

$$s^4 + 2s^2 + s + 1 = \frac{A}{s} + \frac{B}{s-1} + \frac{C}{s+1} + \frac{Ds+E}{s^2+1}$$

$$s^4 + 2s^2 + s + 1 = A(s^2-1)(s^2+1) + Bs(s+1)(s^2+1) + Cs(s-1)(s^2+1)$$
$$+ Ds^2 + Es(s^2-1)$$

Zadatke riješavate jednostrano na ovom papiru, ali na drugoj strani. Na ovoj strani možete pisati, ali sve što ovdje napišete neće vam biti pregledano niti ocijenjeno.



IME I PREZIME: 52807-2005 BROJ INDEKSA:

$$s^4+2s^2+s+1 = A(s^4+\cancel{s^2}-\cancel{s^2}-1)+Bs(s^3+s+s^2+1)+$$

$$Cs(s^3+s-s^2-1)+Ds^2(s^2-1)+Es(s^2-1)$$

$$s^4+2s^2+s+1 = As^4-A+Bs^4+Bs^2+Bs^3+Bs+$$

$$Cs^4+Cs^2-Cs^3-Cs+Ds^4-Ds^2+Es^3-Es$$

$$1 = A+B+C+D \Rightarrow 2 = B+C+\cancel{D}$$

$$0 = B-C+E \qquad 2 = B+C-\cancel{D}$$

$$2 = B+C-D \qquad 4 = 2B+\cancel{2C}$$

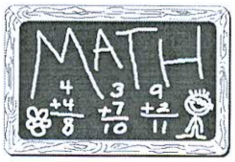
$$1 = B-C-E \;/\cdot 2 \qquad 2 = 2B-\cancel{2C}-2E$$

$$6 = 4B-2E$$

$$\boxed{1 = -A} \qquad \boxed{A = -1}$$

∅

Zadatke rješavate jednostrano na ovom papiru, ali na drugoj strani. Na ovoj strani možete pisati, ali sve što ovdje napišete neće vam biti pregledano niti ocijenjeno.



MATEMATIKA 3: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **Pišite dvostrano!** Obavezno popuniti sva polja ispod⇊

Ime i prezime: BRUNO LIPOTICA **Broj indeksa:** 54960

Vrijeme početka: **Vrijeme završetka:**

Popunjava nastavnik
Broj ↓ bodova

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Ukupno: 0

Tablica integrala

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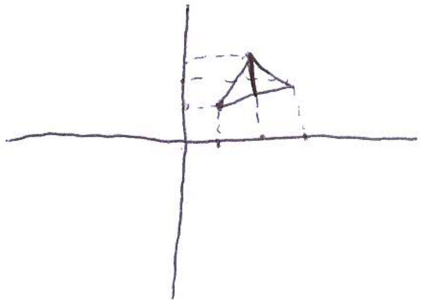
IME I PREZIME: BRUNO LIPOTICA BROJ INDEKSA: 54960

1. $A(1,1)$, $B(2,3)$ $C(3,2)$

$\overrightarrow{AB}$

$$y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$$

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



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

$$y - 1 = 2(x-1)$$

$$y - 1 = 2x - 2$$

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

$$\boxed{y = 2x - 1}$$

$\overrightarrow{AC}$ $y - 1 = \frac{2-1}{3-1}(x-1)$

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

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

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

$$\boxed{y = \frac{1}{2}x + \frac{1}{2}}$$

BC $y - 3 = \frac{2-3}{3-2}(x-2)$

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

$$y - 3 = -1(x-2)$$

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

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

$$\boxed{y = -x + 5}$$

$\longrightarrow$

Zadatke riješavate jednostrano na ovom papiru, ali na drugoj strani. Na ovoj strani možete pisati, ali sve što ovdje napišete neće vam biti pregledano niti ocijenjeno.

$$P_1 = \int_0^1 dx \int_{\frac{1}{2}x+\frac{1}{2}}^{2x-1} dy$$

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

$$\frac{2x^2}{2} - x - \frac{1}{2}\frac{x^2}{2} + \frac{1}{2}x \Big|_0^1$$

$$\frac{2\cdot 1^2}{2} - 1 - \frac{1}{2}\frac{1^2}{2} + \frac{1}{2}\cdot 1$$

$$\frac{2}{2} - 1 - \frac{1}{2} + \frac{1}{2}$$

$$\cancel{1} - \cancel{1} - \cancel{\frac{1}{2}} + \cancel{\frac{1}{2}}$$

$$= 0$$

$$P_2 = \int_1^3 dx \int_{\frac{1}{2}x+\frac{1}{2}}^{-x+5} dy$$

$$P_2 = \int_1^3 -x+5-\frac{1}{2}x+\frac{1}{2}$$

$$P_2 = -\frac{x^2}{2} + 5x - \frac{1}{2}\frac{x^2}{2} + \frac{1}{2}x \Big|_1^3$$

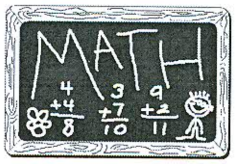
$$P_2 = -\frac{3^2}{2} + 5\cdot 3 - \frac{1}{2}\frac{3^2}{2} + \frac{1}{2}3 - \left(-\frac{1^2}{2} + 5 - \frac{1}{2}\frac{1^2}{2} + \frac{1}{2}\right)$$

$$P_2 = \frac{9}{2} + 15 - \frac{1}{2}\frac{9}{2} + \frac{3}{2} - \left(\frac{1}{2} + 5 - \frac{1}{4} + \frac{1}{2}\right)$$

$$P_2 = \left(\frac{9}{2} + 15 - \frac{9}{4} + \frac{3}{2}\right) - \left(\frac{23}{4}\right)$$

$$P_2 = 18.75 - 5.75$$

$$P_2 = 13$$



$$P_1 + P_2 = 0 + 13 = 13$$

BROJ INDE...

IME: BRUNO CIPOLLA

$$\int_0^{2\pi}\int_0^1 (3-2y)\,dx\,dy$$

[redacted]

$dx\,dy = r\,dr\,dt$

$y = r\sin\varphi$

$\emptyset$

$$\int_0^{2\pi}\int_0^1 (3-2r\sin\varphi)\,r\,dr\,dt$$

$$\int_0^{2\pi}\int_0^1 (3r\,dr\,dt - 2r^2\sin\varphi\,dr\,dt)$$

$$\int_0^{2\pi} 3\frac{r^2}{2} - 2\frac{r^3}{2}\sin\varphi \Big|_0^1$$

$$\int_0^{2\pi} 3\frac{1^2}{2} - 2\frac{1^3}{2}\sin\varphi$$

$$\int_0^{2\pi} \frac{3}{2} - \frac{2}{2}\sin\varphi$$

$$\int_0^{2\pi} \frac{1}{2}\sin\varphi$$

$$\frac{1}{2} - \cos\varphi \Big|_0^{2\pi}$$

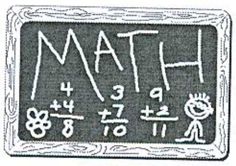
$$\frac{1}{2} - \cos 2\pi - \left(\frac{1}{2} - \cos 0\right)$$

$$\frac{1}{2} - 1 - \left(\frac{1}{2} - 1\right) = -\frac{1}{2} - \left(-\frac{1}{2}\right) = -\frac{1}{2} + \frac{1}{2} = 0$$

Zadatke riješavate <u>jednostrano</u> na ovom papiru, ali na <u>drugoj</u> strani. Na ovoj strani možete pisati, ali sve što ovdje napišete neće vam biti pregledano niti ocijenjeno.

3 (x, y, z)

$r(A) = \sqrt{}$



MATEMATIKA 3: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** Obavezno popuniti sva polja ispod⇊

IME I PREZIME: LUKA KURILIĆ **BROJ INDEKSA:** 58076

VRIJEME POČETKA: **VRIJEME ZAVRŠETKA:**

POPUNJAVA NASTAVNIK
Broj ↓ bodova

1. Zadan trokut T sa vrhovima: $A(1,1)$, $B(2,3)$ i $C(3,2)$ i funkcija $f(x,y)=xy$. Odrediti $\iint\limits_T f(x,y)\,\mathrm{d}x\mathrm{d}y$. 20
2. Neka je K krug radijusa $r=1$ sa centrom u točki $T(2,1)$. Izračunati $\iint\limits_K (3-2y)\,\mathrm{d}x\mathrm{d}y$. 20 20
3. Provjeriti da li je krivuljni integral u vektorskom polju $g(x,y,z)=(2x-1,\,3y+z,\,2z+y)$ neovisan o putu, odnosno da li zavisi samo od početne i završne točke? 20
4. Neka je K kocka stranice duljine $a=2$ centrirana u ishodištu. Izračunati $\iint\limits_{\partial K} (2+3y)\,\mathrm{d}x\mathrm{d}y$. 20
5. Koristeći Laplaceovu transformaciju riješiti diferencijalnu jednadžbu: 20

$$f'''(t)-f'(t)=\cos(t)\,,\quad f(0)=1,\ f'(0)=f''(0)=0.$$

Ukupno: 20

Tablica integrala

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

Tablica

Laplaceovih transformacija:

$f(t)$	$F(s)=\mathcal{L}[f](s)$	$f(t)$	$F(s)=\mathcal{L}[f](s)$
1	$\frac{1}{s}$	$\sinh(at)$	$\frac{a}{s^2-a^2}$
c	$\frac{c}{s}$	$\cosh(at)$	$\frac{s}{s^2-a^2}$
t	$\frac{1}{s^2}$	$e^{-at}f(t)$	$F(s+a)$
t^n	$\frac{n!}{s^{n+1}}$	$f(at)$	$\frac{1}{a}F(\frac{s}{a})$
$\frac{1}{\sqrt{\pi t}}$	$\frac{1}{\sqrt{s}}$	$t^n f(t)$	$(-1)^n F^{(n)}(s)$
e^{-at}	$\frac{1}{s+a}$	$\frac{f(t)}{t}$	$\int_s^\infty F(q)\,\mathrm{d}q$
$t\,e^{-at}$	$\frac{1}{(s+a)^2}$	$\int_0^t f(\tau)\,\mathrm{d}\tau$	$\frac{F(s)}{s}$
$(1-at)e^{-at}$	$\frac{s}{(s+a)^2}$	$f'(t)$	$sF(s)-f(0)$
$\sin(at)$	$\frac{a}{s^2+a^2}$	$f''(t)$	$s^2F(s)-sf(0)-f'(0)$
$\cos(at)$	$\frac{s}{s^2+a^2}$	$f'''(t)$	$s^3F(s)-s^2f(0)-sf'(0)-f''(0)$

Ime i prezime: LUKA KURILIĆ

Broj indeksa: 58076

(5) $f'''(t) - f'(t) = \cos(t)$, $f(0)=1$, $f'(0) = f''(0) = 0$

$$f''' \Rightarrow s^3 f(s) - s^2 \underbrace{f(0)}_{1} - s\,\underbrace{f'(0)}_{0} - \underbrace{f''(0)}_{0}$$

$$\boxed{f''' \Rightarrow s^3 f(s) - s^2}$$

$$f' \Rightarrow s^1 f(s) - \underbrace{f(0)}_{1}$$

$$\boxed{f' \Rightarrow s f(s) - 1}$$

$$s^3 f(s) - s^2 - s f(s) + 1 = \frac{s}{s^2+1^2}$$

$$s^3 f(s) - s f(s) = \frac{s}{s^2+1} + \frac{s^2}{1} - \frac{1}{1}$$

$$f(s)(s^3 - s) = \frac{s + (s^2+1)s^2 - 1(s^2+1)}{s^2+1}$$

$$f(s)(s^3 - s) = \frac{s + s^4 + \cancel{s^2} - \cancel{s^2} - 1}{s^2+1}$$

$$f(s)(s^3 - s) = \frac{s^4 + s - 1}{s^2+1}$$

$$f(s) = \frac{s^4+s-1}{(s^3-s)(s^2+1)}$$

$$f(s) = \frac{s^4+s-1}{s(s^2-1)(s^2+1)}$$

$$\cancel{\frac{A}{s} + \frac{Bs+C}{s^2-1} + \frac{Dx+E}{s^2+1}}$$

$$s^4+s-1 = \frac{A}{s} + \frac{B}{s^2} + \frac{Cs+D}{s^2-1} + \frac{E}{s^2+1} \Big/ s(s^2-1)(s^2+1)$$

$$= A(s^2-1)(s^2+1) + B(s-1)(s^2+1) + (Cx+D)(s^2+1)s + E(s^2-1)s$$

$$= A(s^4 + s^2 - s^2 - 1) + B(s^3 + s - s^2 - 1) + (Cs+D)(s^3+s) + E(s^3-s)$$

$$= As^4 + \cancel{As^2} - \cancel{As^2} - A + Bs^3 + Bs - Bs^2 - B + Cs^4 + Cs^2 + Ds^3 + Ds + Es^3 - Es$$

$=$

(s^4) $1 = A + C$

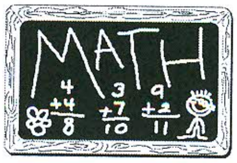
(s^3) $0 = B + D + E$

(s^2) $0 = -B + C$

(s^1) $1 = B + D - E$

(s^0) $-1 = -A - B$

Zadatke riješavate jednostrano na ovom papiru, ali na drugoj strani. Na ovoj strani možete pisati, ali sve što ovdje napišete neće vam biti pregledano niti ocijenjeno.



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5) * Nastavak

$\cancel{-1 = -A - B}$

$\cancel{1 = A + C}$

$\cancel{0 =}$

$0 = B + D + E$

$B = D + E$

$B = -\frac{1}{2} + D$

$1 = B + D - E$

$1 = -\frac{1}{2} + D + D - \frac{1}{2}$

$-2D = -\frac{1}{2} - \frac{1}{2} - 1$

$-2D = -2$

$\boxed{D = 1}$

$1 = A + C$

$1 = \frac{1}{2} + C$

$-C = \frac{1}{2} - 1$

$-C = -\frac{1}{2}$

$\boxed{C = \frac{1}{2}}$

$0 = B + D + E$

$1 = B + D - E \quad / \cdot (-1)$

$0 = \cancel{B} + \cancel{D} + E$

$-1 = -\cancel{B} - \cancel{D} + E \quad +$

$-1 = 2E$

$2E = -1$

$\boxed{E = -\frac{1}{2}}$

$B = -\frac{1}{2} + 1$

$\boxed{B = \frac{1}{2}}$

$-1 = -A - B$

$-1 = -A - \frac{1}{2}$

$A = 1 - \frac{1}{2}$

$\boxed{A = \frac{1}{2}}$

$A = \frac{1}{2}$

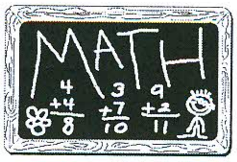
$B = \frac{1}{2}$

$C = \frac{1}{2}$

$D = 1$

$E = -\frac{1}{2}$

Zadatke riješavate jednostrano na ovom papiru, ali na drugoj strani. Na ovoj strani možete pisati, ali sve što ovdje napišete neće vam biti pregledano niti ocijenjeno.



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5 **NASTAVAK

$$\frac{A}{s} + \frac{B}{s^2} + \frac{Cs+D}{s^2-1} + \frac{E}{s^2+1}$$

$$f(s) = \frac{\frac{1}{2}}{s} + \frac{\frac{1}{2}}{s^2} + \frac{\frac{1}{2}s+1}{s^2-1} - \frac{\frac{1}{2}}{s^2+1} = \frac{\frac{1}{2}}{s} + \frac{\frac{1}{2}}{s^2} + \frac{\frac{1}{2}s}{s^2-1} + \frac{1}{s^2-1} - \frac{\frac{1}{2}}{s^2+1}$$

$=$

$$\cancel{F(t) = \frac{1}{2} + \frac{1}{2}t + \frac{1}{2}\cosh(1t) + \sinh(1t) - \frac{1}{2}\sin(1t)}$$

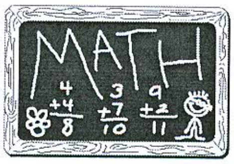
$$F(t) = \frac{1}{2} + \frac{1}{2}t + \cosh\left(\frac{1}{2}t\right) + \sinh(1t) - \sin\left(\frac{1}{2}t\right)$$

UVRSTI U JEDNADŽBE I PROVJERI DA NE ODGOVARA.

X

0

Zadatke riješavate jednostrano na ovom papiru, ali na drugoj strani. Na ovoj strani možete pisati, ali sve što ovdje napišete neće vam biti pregledano niti ocijenjeno.



IME I PREZIME: LUKA KURILIĆ BROJ INDEKSA: 58076

2) $r=1$

$T(\underset{p}{2},\underset{g}{1})$

$x = r\cos\varphi + p \Rightarrow r\cos\varphi\, d\varphi + 2$

$y = r\sin\varphi + g \Rightarrow r\sin\varphi\, d\varphi + 1$

$\iint\limits_K (3-2y)\,dx\,dy$

$\int_0^{2\pi} d\varphi \int_0^1 (3 - 2(r\sin\varphi + 1))\, r\,dr$ ✓

$\int_0^{2\pi} d\varphi \int_0^1 (3 - 2r\sin\varphi - 2)\, r\,dr$

$\int_0^{2\pi} d\varphi \int_0^1 (1 - 2r\sin\varphi)\, r\,dr$

$\int_0^{2\pi} d\varphi \int_0^1 r\,dr - 2\int_0^1 r^2 \sin\varphi\, dr$

$\int_0^{2\pi} d\varphi \int_0^1 r\,dr - 2\sin\varphi \int_0^1 r^2\,dr$

$\int_0^{2\pi} d\varphi \left[\frac{r^2}{2}\Big|_0^1 - 2\sin\varphi \frac{r^3}{3}\Big|_0^1 \right]$

$\int_0^{2\pi} d\varphi \left[\left(\frac{1^2}{2} - \frac{0^2}{2}\right) - \left(2\sin\varphi\left(\frac{1^3}{3} - \frac{0^3}{3}\right)\right) \right]$

$\int_0^{2\pi} d\varphi \left[\frac{1}{2} - 2\sin\varphi \frac{1}{3} \right]$

$\int_0^{2\pi} d\varphi \left[\frac{1}{2} - \frac{2}{3}\sin\varphi \right]$

$\frac{1}{2}\int_0^{2\pi} d\varphi - \frac{2}{3}\int_0^{2\pi} \sin\varphi\, d\varphi$

$\frac{1}{2}\varphi\Big|_0^{2\pi} + \frac{2}{3}\cos\varphi\Big|_0^{2\pi}$

$\left[\left(\frac{1}{2}\cdot 2\pi\right) - \left(\frac{1}{2}\cdot 0\right)\right] + \left[\left(\frac{2}{3}\cos 2\pi\right) - \left(\frac{2}{3}\cos 0\right)\right]$

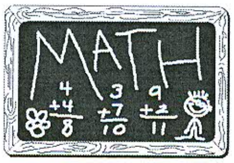
$[\pi - 0] + \left[\frac{2}{3} - \left(\frac{2}{3}\cdot 1\right)\right]$

$\pi + \left(\frac{2}{3} - \frac{2}{3}\right)$

$\pi + 0 = \pi$ ✓

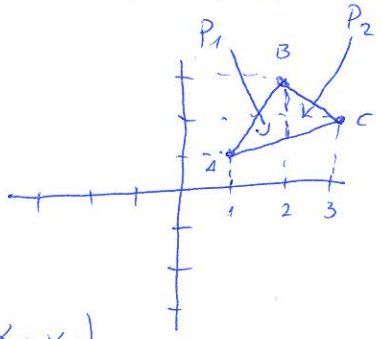
20

Zadatke riješavate jednostrano na ovom papiru, ali na drugoj strani. Na ovoj strani možete pisati, ali sve što ovdje napišete neće vam biti pregledano niti ocijenjeno.



IME I PREZIME: LUKA KURILIĆ BROJ INDEKSA: 58076

1) $A(1,1)$ $B(2,3)$ $C(3,2)$ $f(x,y) = xy$



$$\iint_T f(x,y)\,dx\,dy$$

$$AB \Rightarrow y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$$

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

$$y - 1 = 2(x-1)$$

$$y - 1 = 2x - 2$$

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

$$\overline{AB} \Rightarrow \boxed{y = 2x - 1}$$

$$BC \Rightarrow y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$$

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

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

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

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

$$\overline{BC} \Rightarrow \boxed{y = -x + 5}$$

$$AC \Rightarrow y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$$

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

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

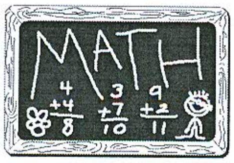
$$y - 1 = \frac{1}{2}x - \frac{1}{2}$$

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

$$\boxed{y = \frac{1}{2}x - \cancel{\frac{3}{2}}} \Leftarrow \overline{AC}$$

$$I = \int_1^2 \int_{\frac{1}{2}x - \frac{3}{2}}^{2x-1} xy\,dx\,dy + \int_2^3 \int_{\frac{1}{2}x - \frac{3}{2}}^{-x+5} xy\,dx\,dy$$

Zadatke riješavate jednostrano na ovom papiru, ali na drugoj strani. Na ovoj strani možete pisati, ali sve što ovdje napišete neće vam biti pregledano niti ocijenjeno.



MATEMATIKA 3: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **Pišite dvostrano!** Obavezno popuniti sva polja ispod⇊

Ime i prezime: MATIJA ŠKIBOLA **Broj indeksa:**

Vrijeme početka: **Vrijeme završetka:**

Popunjava nastavnik — Broj ↓ bodova

1. Zadan trokut T sa vrhovima: $A(1,1)$, $B(2,3)$ i $C(3,2)$ i funkcija $f(x,y)=xy$. Odrediti $\iint_T f(x,y)\,\mathrm{d}x\mathrm{d}y$. 20
2. Neka je K krug radijusa $r=1$ sa centrom u točki $T(2,1)$. Izračunati $\iint_K (3-2y)\,\mathrm{d}x\mathrm{d}y$. 20
3. Provjeriti da li je krivuljni integral u vektorskom polju $g(x,y,z)=(2x-1,\,3y+z,\,2z+y)$ neovisan o putu, odnosno da li zavisi samo od početne i završne točke? 20
4. Neka je K kocka stranice duljine $a=2$ centrirana u ishodištu. Izračunati $\iint_{\partial K} (2+3y)\,\mathrm{d}x\mathrm{d}y$. 20
5. Koristeći Laplaceovu transformaciju riješiti diferencijalnu jednadžbu: 20

$$f'''(t)-f'(t)=\cos(t),\quad f(0)=1,\ f'(0)=f''(0)=0.$$

Ukupno: 6

Tablica integrala

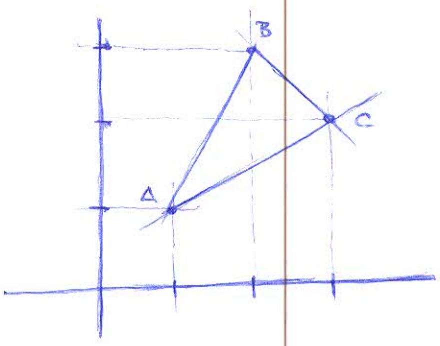
$\int \mathrm{d}x = x + C$	$\int \frac{\mathrm{d}x}{\cos^2 x} = \tan x + C$	$\int \frac{\mathrm{d}x}{a^2+x^2} = \frac{1}{a}\arctan\frac{x}{a} + C$
$\int x^n\,\mathrm{d}x = \frac{x^{n+1}}{n+1},\ n\neq -1$	$\int \frac{\mathrm{d}x}{\sin^2 x} = -\cot x + C$	$\int \frac{\mathrm{d}x}{a^2-x^2} = \frac{1}{2a}\ln\left\lvert\frac{a+x}{a-x}\right\rvert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

Tablica Laplaceovih transformacija:

$f(t)$	$F(s)=\mathcal{L}[f](s)$	$f(t)$	$F(s)=\mathcal{L}[f](s)$
1	$\frac{1}{s}$	$\sinh(at)$	$\frac{a}{s^2-a^2}$
c	$\frac{c}{s}$	$\cosh(at)$	$\frac{s}{s^2-a^2}$
t	$\frac{1}{s^2}$	$e^{-at}f(t)$	$F(s+a)$
t^n	$\frac{n!}{s^{n+1}}$	$f(at)$	$\frac{1}{a}F(\frac{s}{a})$
$\frac{1}{\sqrt{\pi t}}$	$\frac{1}{\sqrt{s}}$	$t^n f(t)$	$(-1)^n F^{(n)}(s)$
e^{-at}	$\frac{1}{s+a}$	$\frac{f(t)}{t}$	$\int_s^\infty F(q)\,\mathrm{d}q$
$t\,e^{-at}$	$\frac{1}{(s+a)^2}$	$\int_0^t f(\tau)\,\mathrm{d}\tau$	$\frac{F(s)}{s}$
$(1-at)\,e^{-at}$	$\frac{s}{(s+a)^2}$	$f'(t)$	$sF(s)-f(0)$
$\sin(at)$	$\frac{a}{s^2+a^2}$	$f''(t)$	$s^2F(s)-sf(0)-f'(0)$
$\cos(at)$	$\frac{s}{s^2+a^2}$	$f'''(t)$	$s^3F(s)-s^2f(0)-sf'(0)-f''(0)$

Ime i prezime: ŠKIBOLA MATIJA Broj indeksa:

① $A(\overset{x_1}{1},\overset{y_1}{1})$ $B(\overset{x_2\ x_1}{2},\overset{y_2\ y_1}{3})$ $C(\overset{x_2}{3},\overset{y_2}{2})$



AB... $y-y_1=\frac{y_2-y_1}{x_2-x_1}(x-x_1)$

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

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

$y-1=2x-2$

$y=2x-2+1$

$\boxed{y=2x-1}$

AC... $y-y_1=\frac{y_2-y_1}{x_2-x_1}(x-x_1)$

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

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

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

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

$\boxed{y=\frac{1}{2}x+\frac{1}{2}}$

BC... $y-y_1=\frac{y_2-y_1}{x_2-x_1}(x-x_1)$

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

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

$y-3=-x+2$

$y=\cancel{3}-x+2+3$

$\boxed{y=-x+5}$

$$\int_1^2 dx\int_{\frac{1}{2}x+\frac{1}{2}}^{2x-1}dy=\int_1^2 dx\; y\Big/_{\frac{1}{2}x+\frac{1}{2}}^{2x-1}=\int_1^2 dx\left(2x-1-\frac{1}{2}x-\frac{1}{2}\right)$$

$$=\int_1^2 2x\,dx-\int_1^2 dx-\int_1^2\frac{1}{2}x\,dx-\int_1^2\frac{1}{2}dx$$

$$=\frac{2x^2}{2}\Big/_1^2-x\Big/_1^2-\frac{1}{2}\cdot\frac{x^2}{2}\Big/_1^2-\frac{1}{2}x\Big/_1^2$$

$$=\frac{2}{2}\cdot(2^2-1^2)-1-\frac{1}{2}\cdot\frac{1}{2}(2^2-1^2)-\frac{1}{2}(2-1)=\frac{2}{2}\cdot5-1-\frac{1}{2}\cdot\frac{1}{2}\cdot5-\frac{1}{2}\cdot1$$

$$=\frac{5}{2}-1-\frac{1}{2}\cdot\frac{5}{2}-\frac{1}{2}=\frac{5}{2}-\frac{1}{1}-\frac{5}{4}-\frac{1}{2}=\frac{10-4-5-2}{4}=-\frac{1}{4}\quad\boxed{P=\left|\frac{1}{4}\right|}$$

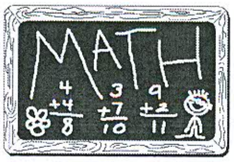
$$\int_2^3 dx\int_{\frac{1}{2}x+\frac{1}{2}}^{-x+5}dy=\int_2^3 dx\; y\Big/_{\frac{1}{2}x+\frac{1}{2}}^{-x+5}=\int_2^3 dx\left(-x+5-\frac{1}{2}x-\frac{1}{2}\right)=\int_2^3 -x\,dx+\int_2^3 5\,dx-\int_2^3\frac{1}{2}x\,dx-\int_2^3\frac{1}{2}dx$$

$$=-\frac{x^2}{2}\Big/_2^3+5x\Big/_2^3-\frac{1}{2}\cdot\frac{x^2}{2}\Big/_2^3-\frac{1}{2}x\Big/_2^3=-\frac{1}{2}\cdot(3^2-2^2)+5(3-2)-\frac{1}{2}\cdot\frac{1}{2}(3^2-2^2)-\frac{1}{2}(3-2)$$

$$=-\frac{1}{2}\cdot13+5-\frac{1}{2}\cdot\frac{1}{2}\cdot\frac{13}{1}-\frac{1}{2}\cdot1=-\frac{13}{2}+5-\frac{1}{2}\cdot\frac{13}{2}-\frac{1}{2}=-\frac{13}{2}+\frac{5}{1}-\frac{13}{4}-\frac{1}{2}=\frac{-26+20-13-2}{4}=-\frac{21}{4}\quad P=\left|\frac{21}{4}\right|$$

$P=\frac{1}{4}+\frac{21}{4}$ $P=\frac{22}{4}$ $\boxed{P=\frac{11}{2}}$

Zadatke riješavate jednostrano na ovom papiru, ali na drugoj strani. Na ovoj strani možete pisati, ali sve što ovdje napišete neće vam biti pregledano niti ocijenjeno.



IME I PREZIME: ŠKIBOLA MATIJA BROJ INDEKSA:

5. $f'''(t) - f'(t) = \cos(t)$ $f(0)=1,\ f'(0)=f''(0)=0$

$s^3 F(s) - s^2 \cdot f(0) - s \cdot f'(0) - f''(0) - sF(s) - f(0) = \frac{s}{s^2+1^2}$

$s^3 F(s) - s^2 \cdot 1 - s \cdot 0 - 0 - sF(s) - 1 = \frac{s}{s^2+1}$

$\cancel{F(s)(s^3-s)}$

$s^3 F(s) - s^2 - sF(s) - 1 = \frac{s}{s^2+1}$

$F(s)(s^3-s) = \frac{s}{s^2+1} + \frac{1+s^2}{1}$

$\cancel{F(s)(s^3-s) = s + (s^2+1)(1+s^2) \Rightarrow s + s^2 + s^4 + 1 + s^2}$

$F(s) = \frac{\frac{s+1+s^2}{s^2+1}}{\frac{s^3-s}{1}} \Rightarrow \frac{s+1+s^2}{(s^2+1)(s^3-s)} \Rightarrow \frac{s+1+s^2}{(s^2+1)s(s^2-1)}$ $\frac{s^2+s+1}{(s^2+1)s(s^2-1)}$

$F(s) = \frac{As+B}{s^2+1} + \frac{C}{s} + \frac{Ds+E}{s^2-1}$

$F(s) = (As+B)s(s^2-1) + C(s^2+1)(s^2-1) + (Ds+E)(s^2+1)s$

$F(s) = (As^2+Bs)(s^2-1) + (Cs^2+C)(s^2-1) + (Ds^2+Es)(s^2+1)$ $\cancel{Ds^3+Ds+Es^2+E}$

$= As^4 - As^2 + Bs^3 - Bs + Cs^4 - Cs^2 + Cs^2 - C + Ds^4 + Ds^2 + Es^3 + Es$

$F(s) = s^4(A+C+D) + s^3(B+E) + s^2(-A+D) + s(-B+E) + C$

$A+C+D=0$

$B+E=0$

$-A+D=1$

$-B+E=1$

$-C=1 \Rightarrow C=1$

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