

UNIVERZITET U SARAJEVU
PRIRODNO-MATEMATIČKI FAKULTET
ODSJEK ZA FIZIKU

NASLOV
PODNASLOV

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Sadržaj

1	Naslov	3
1.1	Podnaslov	3
1.1.1	Podpodnaslov	3
2	Primjeri	4
2.1	Slika	4
2.2	Zadatak	4
2.3	Tabela	5
2.4	Kompleksnija tabela	5
2.5	Mjerne jedinice	5
2.6	Matematika	6

Spisak slika

2.1	Logo PMF koji nije Word 2003 clip art	4
2.2	Slika uz zadatak 1	4
2.3	Slika uz zadatak 2	6

Spisak tabela

2.1	Tabela s paketom booktabs.	5
2.2	Kompleksna tabela	5

1 Naslov

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1.1 Podnaslov

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1.1.1 Podpodnaslov

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2 Primjeri

2.1 Slika

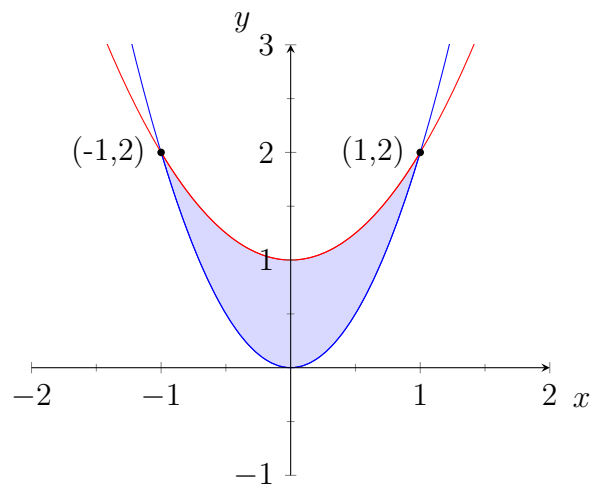


Slika 2.1: Logo PMF koji nije Word 2003 clip art

2.2 Zadatak

Zadatak 1 Izračunati integral I ako je D oblast ograničena sa $y_1 = 2x^2$, $y_2 = 1 + x^2$.

$$I = \iint_D (x + 2y) \, dx \, dy.$$



Slika 2.2: Slika uz zadatak 1

Prvi korak je odrediti granice: $2x^2 = 1 + x^2 \implies x = \pm 1$. Tačke presjeka su dakle $(1, 2)$ i $(-1, 2)$.

$$x \Big|_{-1}^1, \quad y \Big|_{2x^2}^{1+x^2}.$$

$$\begin{aligned}
I &= \int_{-1}^1 dx \int_{2x^2}^{1+x^2} (x+2y) dy = \int_{-1}^1 dx \left(xy \Big|_{2x^2}^{1+x^2} + 2y^2 \Big|_{2x^2}^{1+x^2} \right) \\
&= \int_{-1}^1 \{x(1+x^2-2x^2) + 2[(1+x^2)^2 - (2x^2)^2]\} dx \\
&= \dots = \frac{32}{15}.
\end{aligned} \tag{1}$$

2.3 Tabela

Value 1	Value 2	Value 3
α	β	γ
1	1110.1	a
2	10.1	b
3	23.113 231	c

Tabela 2.1: Tabela s paketom booktabs.

2.4 Kompleksnija tabela

m	$\operatorname{Re}\{\mathfrak{X}(m)\}$	$-\operatorname{Im}\{\mathfrak{X}(m)\}$	$\mathfrak{X}(m)$	$\frac{\mathfrak{X}(m)}{23}$	A_m	$\varphi(m) / ^\circ$	$\varphi_m / ^\circ$
1	16.128	8.872	16.128	1.402	1.373	−146.6	−137.6
2	3.442	−2.509	3.442	0.299	0.343	133.2	152.4
3	1.826	−0.363	1.826	0.159	0.119	168.5	−161.1
4	0.993	−0.429	0.993	0.086	0.08	25.6	90
5	1.29	0.099	1.29	0.112	0.097	−175.6	−114.7
6	0.483	−0.183	0.483	0.042	0.063	22.3	122.5
7	0.766	−0.475	0.766	0.067	0.039	141.6	−122
8	0.624	0.365	0.624	0.054	0.04	−35.7	90
9	0.641	−0.466	0.641	0.056	0.045	133.3	−106.3
10	0.45	0.421	0.45	0.039	0.034	−69.4	110.9
11	0.598	−0.597	0.598	0.052	0.025	92.3	−109.3

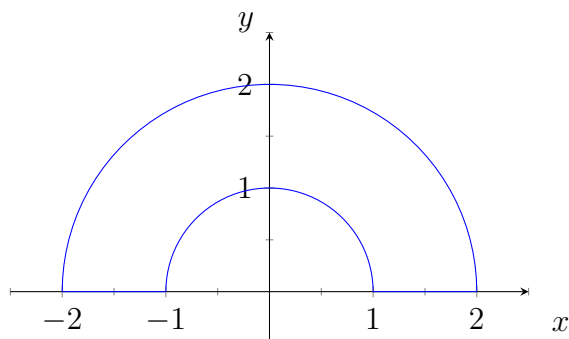
Tabela 2.2: Kompleksna tabela

2.5 Mjerne jedinice

Paket `siunits` dozvoljava da se lako i pravilno pišu veličine koje imaju mjerne jedinice. Kako se često pogrešno radi: $g = 9.81ms^{-2}$. Kako je pravilno: $g = 9.81\text{ m s}^{-2}$.

2.6 Matematika

Zadatak 2 Izračunati $\oint y^2 dx + 3xy dy$ na konturi sa slike 2.3.



Slika 2.3: Slika uz zadatak 2

$$\oint_C P dx + Q dy = \iint \left(\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y} \right) dx dy$$

$$Q = 3xy, \quad \frac{\partial Q}{\partial x} = 3y$$

$$P = y^2, \quad \frac{\partial P}{\partial y} = 2y$$

$$r \Big|_1^2, \quad \varphi \Big|_0^\pi$$

$$\begin{aligned} \oint_C &= \iint_C (3y - 2y) dx dy = \iint_C y dx dy \\ &= \int_1^2 \int_0^\pi r^2 \sin \varphi dr d\varphi = \frac{r^3}{3} \Big|_1^2 (-\cos \varphi) \Big|_0^\pi = \frac{14}{3}. \end{aligned}$$

Zadatak 3 Ako je vektorsko polje oblika $\mathbf{F} = P\mathbf{i} + Q\mathbf{j} + R\mathbf{k}$ dokazati da je $\text{div rot } \mathbf{F} = 0$.

$$\begin{aligned} \text{rot } \mathbf{F} &= \left(\frac{\partial R}{\partial y} - \frac{\partial Q}{\partial z} \right) \mathbf{i} - \left(\frac{\partial R}{\partial x} - \frac{\partial P}{\partial z} \right) \mathbf{j} + \left(\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y} \right) \mathbf{k} \\ \text{div rot } \mathbf{F} &= \frac{\partial}{\partial x} \left(\frac{\partial R}{\partial y} - \frac{\partial Q}{\partial z} \right) - \frac{\partial}{\partial y} \left(\frac{\partial R}{\partial x} - \frac{\partial P}{\partial z} \right) + \frac{\partial}{\partial z} \left(\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y} \right) = 0. \end{aligned}$$