



Moduli – zbirke funkcija

Moduli – zbirke funkcija

Python ima velik broj ugrađenih funkcija.

Moduli su zbirke funkcija, u kojima su funkcije grupirane na temelju nekih zajedničkih svojstava. Module koristimo prema potrebi.

<https://python.readthedocs.io/en/stable/py-modindex.html>



Python Module Index

[_](#) [|](#) [a](#) [|](#) [b](#) [|](#) [c](#) [|](#) [d](#) [|](#) [e](#) [|](#) [f](#) [|](#) [g](#) [|](#) [h](#) [|](#) [i](#) [|](#) [j](#) [|](#) [k](#) [|](#) [l](#) [|](#) [m](#) [|](#) [n](#) [|](#) [o](#) [|](#) [p](#) [|](#) [q](#) [|](#) [r](#) [|](#) [s](#) [|](#) [t](#) [|](#) [u](#) [|](#) [v](#) [|](#) [w](#) [|](#) [x](#) [|](#) [z](#)

<code>__future__</code>	<i>Future statement definitions</i>
<code>__main__</code>	<i>The environment where the top-level script is run.</i>
<code>__dummy_thread</code>	<i>Drop-in replacement for the <code>_thread</code> module.</i>
<code>_thread</code>	<i>Low-level threading API.</i>
a	
<code>abc</code>	<i>Abstract base classes according to PEP 3119.</i>
<code>aifc</code>	<i>Read and write audio files in AIFF or AIFC format.</i>
<code>argparse</code>	<i>Command-line option and argument parsing library.</i>
<code>array</code>	<i>Space efficient arrays of uniformly typed numeric values.</i>
<code>ast</code>	<i>Abstract Syntax Tree classes and manipulation.</i>
<code>asynchat</code>	<i>Support for asynchronous command/response protocols.</i>
<code>asyncio</code>	<i>Asynchronous I/O, event loop, coroutines and tasks.</i>
<code>asyncore</code>	<i>A base class for developing asynchronous socket handling services.</i>
<code>atexit</code>	<i>Register and execute cleanup functions.</i>
<code>audioop</code>	<i>Manipulate raw audio data.</i>
b	
<code>base64</code>	<i>RFC 3548: Base16, Base32, Base64 Data Encodings; Base85 and Ascii85</i>
<code>bdb</code>	<i>Debugger framework.</i>
<code>binascii</code>	<i>Tools for converting between binary and various ASCII-encoded binary representations.</i>
<code>binhex</code>	<i>Encode and decode files in binhex4 format.</i>
<code>bisect</code>	<i>Array bisection algorithms for binary searching.</i>
<code>builtins</code>	<i>The module that provides the built-in namespace.</i>
<code>bz2</code>	<i>Interfaces for bzip2 compression and decompression.</i>
c	
<code>calendar</code>	<i>Functions for working with calendars, including some emulation of the Unix <code>cal</code> program.</i>
<code>cgi</code>	<i>Helpers for running Python scripts via the Common Gateway Interface.</i>
<code>cgitb</code>	<i>Configurable traceback handler for CGI scripts.</i>
<code>chunk</code>	<i>Module to read IFF chunks.</i>
<code>cmath</code>	<i>Mathematical functions for complex numbers.</i>
<code>cmd</code>	<i>Build line-oriented command interpreters.</i>
<code>code</code>	<i>Facilities to implement read-eval-print loops.</i>
<code>codecs</code>	<i>Encode and decode data and streams.</i>
<code>codeop</code>	<i>Compile (possibly incomplete) Python code.</i>
<code>collections</code>	<i>Container datatypes</i>
<code>colorsys</code>	<i>Conversion functions between RGB and other color systems.</i>
<code>compileall</code>	<i>Tools for byte-compiling all Python source files in a directory tree.</i>

Moduli – zbirke funkcija

m	
macpath	Mac OS 9 path manipulation functions.
mailbox	Manipulate mailboxes in various formats
mailcap	Mailcap file handling.
marshal	Convert Python objects to streams of bytes and back (with different constraints).
<u>math</u>	Mathematical functions (sin() etc.).
mimetypes	Mapping of filename extensions to MIME types.
mmap	Interface to memory-mapped files for Unix and Windows.
modulefinder	Find modules used by a script.
msilib (Windows)	Creation of Microsoft Installer files, and CAB files.
msvcrt (Windows)	Miscellaneous useful routines from the MS VC++ runtime.
⊕ multiprocessing	Process-based parallelism.
n	
netrc	Loading of .netrc files.
nis (Unix)	Interface to Sun's NIS (Yellow Pages) library.
nntplib	NNTP protocol client (requires sockets).
numbers	Numeric abstract base classes (Complex, Real, Integral, etc.).
o	
operator	Functions corresponding to the standard operators.
optparse	Deprecated: Command-line option parsing library.
⊕ os	Miscellaneous operating system interfaces.
ossaudiodev (Linux, FreeBSD)	Access to OSS-compatible audio devices.

Moduli – zbirke funkcija

r	
<code>random</code>	<i>Generate pseudo-random numbers with various common distributions.</i>
<code>re</code>	<i>Regular expression operations.</i>
<code>readline (Unix)</code>	<i>GNU readline support for Python.</i>
<code>replib</code>	<i>Alternate repr() implementation with size limits.</i>
<code>resource (Unix)</code>	<i>An interface to provide resource usage information on the current process.</i>
<code>rlcompleter</code>	<i>Python identifier completion, suitable for the GNU readline library.</i>
<code>runpy</code>	<i>Locate and run Python modules without importing them first.</i>
s	
<code>sched</code>	<i>General purpose event scheduler.</i>
<code>secrets</code>	<i>Generate secure random numbers for managing secrets.</i>
<code>select</code>	<i>Wait for I/O completion on multiple streams.</i>
<code>selectors</code>	<i>High-level I/O multiplexing.</i>
<code>shelve</code>	<i>Python object persistence.</i>
<code>shlex</code>	<i>Simple lexical analysis for Unix shell-like languages.</i>
<code>shutil</code>	<i>High-level file operations, including copying.</i>
<code>signal</code>	<i>Set handlers for asynchronous events.</i>
<code>site</code>	<i>Module responsible for site-specific configuration.</i>
<code>smtpd</code>	<i>A SMTP server implementation in Python.</i>
<code>smtplib</code>	<i>SMTP protocol client (requires sockets).</i>
<code>sndhdr</code>	<i>Determine type of a sound file.</i>
<code>socket</code>	<i>Low-level networking interface.</i>
<code>socketserver</code>	<i>A framework for network servers.</i>
<code>spwd (Unix)</code>	<i>The shadow password database (getspnam() and friends).</i>
<code>sqlite3</code>	<i>A DB-API 2.0 implementation using SQLite 3.x.</i>
<code>ssl</code>	<i>TLS/SSL wrapper for socket objects</i>
<code>stat</code>	<i>Utilities for interpreting the results of os.stat(), os.lstat() and os.fstat().</i>
<code>statistics</code>	<i>mathematical statistics functions</i>
<code>string</code>	<i>Common string operations.</i>
<code>stringprep</code>	<i>String preparation, as per RFC 3453</i>
<code>struct</code>	<i>Interpret bytes as packed binary data.</i>

Modul math

Modul se prije korištenja treba uvesti s naredbom **import naziv_modula**
Funkcija **sqrt** (korijen) je iz **math** modula.

```
>>> import math
>>> math.sqrt(255)
15.968719422671311
>>> math.sqrt(64)
8.0
>>> math.sqrt(2)
1.4142135623730951
>>> math.sqrt(5)
2.23606797749979
>>>
```

Modul math

Drugi način kako možemo uvesti funkciju iz modula je s naredbom **from naziv_modula import** funkcija1, funkcija2,...

```
>>> from math import sqrt, sin, cos, tan, atan, fabs
>>> sqrt(25)
5.0
>>> sin(13)
0.4201670368266409
>>> cos(25)
0.9912028118634736
>>> tan(128)
-1.0406148914328552
>>> atan(0.64)
0.5693131911006619
>>> fabs(-25)
25.0
>>>
```

Funkcija **fabs** vraća
apsolutnu vrijednost broja.

Modul math

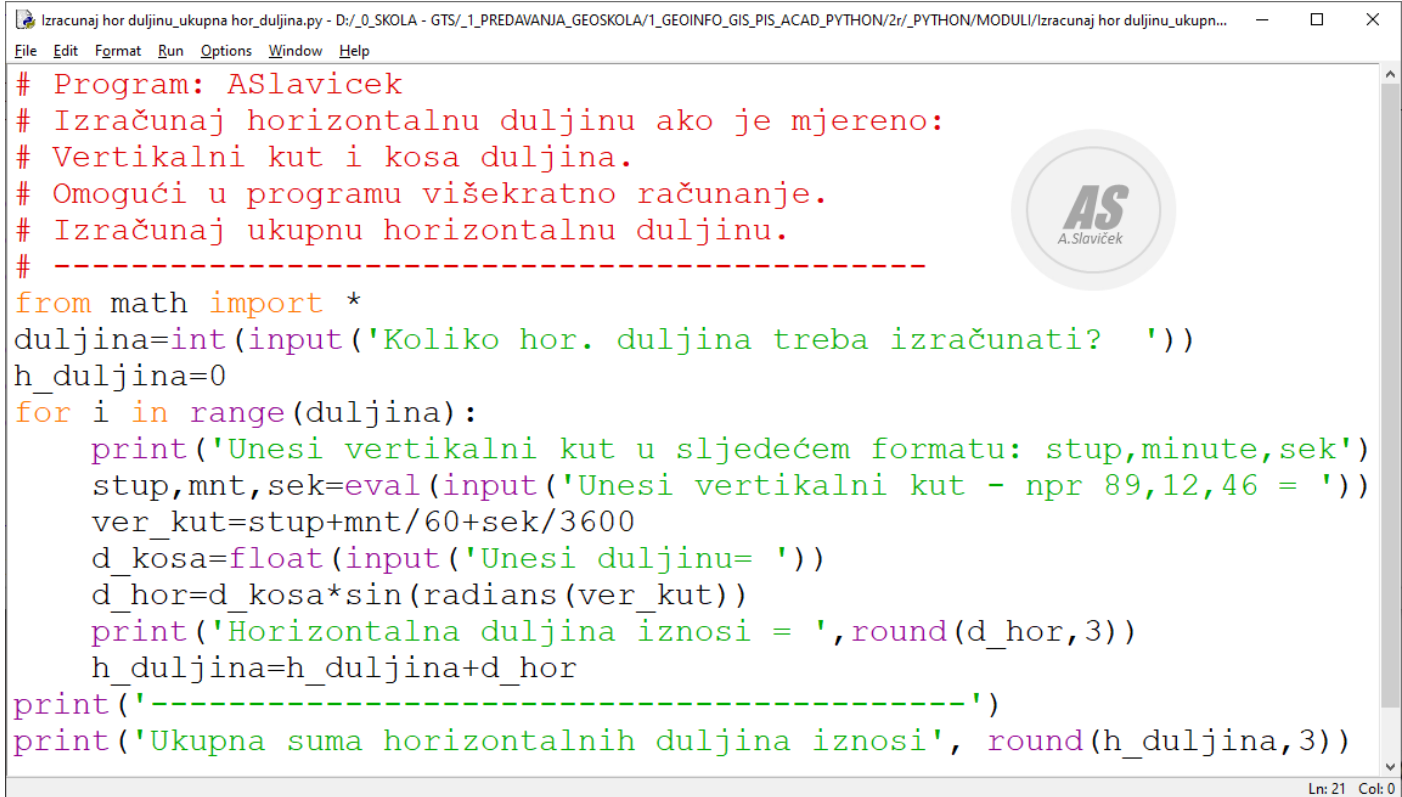
Ako se žele uvesti sve funkcije iz nekog modula koristimo naredbu:

```
>>> from math import *
>>> sqrt(81)
9.0
>>> sin(45)
0.8509035245341184
>>> sin(radians(45))
0.7071067811865475
>>> cos(60)
-0.9524129804151563
>>> cos(radians(60))
0.5000000000000001
>>> tan(37.456789)
-0.24718005688289044
>>> tan(radians(37.456789))
0.7661294557649995
>>>
```

Modul math

```
*Izracunaj hor duljinu.py - D:/_0_SKOLA - GTS/_1_PREDAVANJA_GEOSKOLA/1_GEOINFO_GIS_PIS_ACAD_PYTHON/2r_PYTHON/MODULI/Izracunaj hor duljinu.py (3.6.3)*
File Edit Format Run Options Window Help
# Program: ASlavicek
# Izračunaj horizontalnu duljinu ako je mjereno:
# Vertikalni kut i kosa duljina.
from math import *
print('Unesi vertikalni kut u sljedećem formatu: stup,minute,sek')
stup,mnt,sek=eval(input('Unesi vertikalni kut - npr 89,12,46 = '))
ver_kut=stup+mnt/60+sek/3600
d_kosa=float(input('Unesi duljinu= '))
d_hor=d_kosa*sin(radians(ver_kut))
print('Horizontalna duljina iznosi = ',round(d_hor,3))
```


Modul math




```
Izracunaj hor duljinu_ukupna hor_duljina.py - D:/_0_SKOLA - GTS/_1_PREDAVANJA_GEOSKOLA/1_GEOINFO_GIS_PIS_ACAD_PYTHON/2r/_PYTHON/MODULI/Izracunaj hor duljinu_ukupn...
File Edit Format Run Options Window Help

# Program: ASlavicek
# Izračunaj horizontalnu duljinu ako je mjereno:
# Vertikalni kut i kosa duljina.
# Omogući u programu višekratno računanje.
# Izračunaj ukupnu horizontalnu duljinu.
# -----

from math import *
duljina=int(input('Koliko hor. duljina treba izračunati? '))
h_duljina=0
for i in range(duljina):
    print('Unesi vertikalni kut u sljedećem formatu: stup,minute,sek')
    stup,mnt,sek=eval(input('Unesi vertikalni kut - npr 89,12,46 = '))
    ver_kut=stup+mnt/60+sek/3600
    d_kosa=float(input('Unesi duljinu= '))
    d_hor=d_kosa*sin(radians(ver_kut))
    print('Horizontalna duljina iznosi = ',round(d_hor,3))
    h_duljina=h_duljina+d_hor
print('-----')
print('Ukupna suma horizontalnih duljina iznosi', round(h_duljina,3))

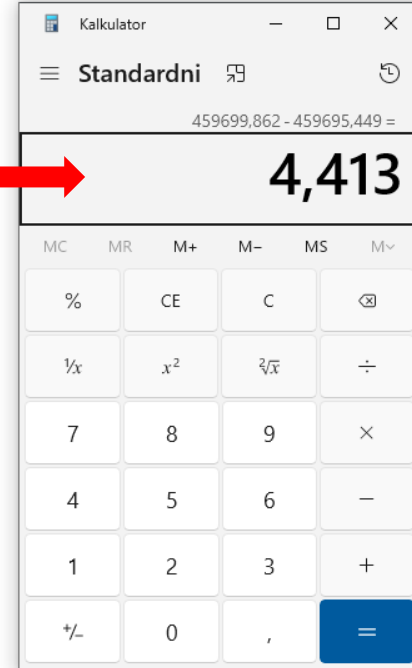
Ln: 21 Col: 0
```



Modul math


Pažnja!!!

```
IDLE Shell 3.11.0
File Edit Shell Debug Options Window Help
Python 3.11.0 (main, Oct 24 2022, 18:26:48) [MSC v.193
3 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for
more information.
>>> Ea=459695.449
>>> Na=5070674.539
>>> Eb=459699.862
>>> Nb=5070545.203
>>> Delta_E=Eb-Ea
>>> Delta_E
4.4130000000000466
>>> Delta_N=Nb-Na
-129.33600000012666
>>> Delta_N=round(Eb-Ea)
>>> Delta_N
4
>>> Delta_N=round(Eb-Ea, 3)
>>> Delta_N
4.413
>>>
```



Presijecanje naprijed

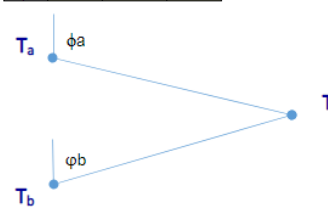
Presijecanje naprijed



1.

	E	N
Ta	459695.45	5070674.54
Tb	459699.86	5070545.20

ϕ_a	130	47	58
ϕ_b	41	13	26



Eb-Ea	4.41
Nb-Na	-129.34
Na * tg ϕ_a	-5874548.151
Nb * tg ϕ_b	4442662.469
tg ϕ_a - tg ϕ_b	-2.034704429

$$N = \frac{(Eb - Ea) + Na \operatorname{tg} \phi_a - Nb \operatorname{tg} \phi_b}{\operatorname{tg} \phi_a - \operatorname{tg} \phi_b} = \frac{-10317206.21}{-2.034704429} = \mathbf{5070616.676}$$

(N - Na) ϕ_a	67.03584292
(N - Nb) ϕ_b	62.62284292

E =	Ea + (N - Na) tg ϕ_a	=	459762.485
E =	Eb + (N - Nb) tg ϕ_b	=	459762.485

	E	N
T	459,762.485	5,070,616.676

© ASlavicek, 2021. slavicek@geoskola.hr

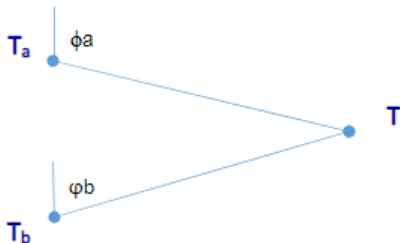
<https://geoskolazg.weebly.com/triangulacija.html>

```
# ASlavicek
# PRESIJEKANJE NAPRIJED
#-----
# Primjer Ea=459695.449 Na=5070674.539
# Primjer Eb=459699.862 Nb=5070545.203
# fa=130,47,58 fb=41,13,26 - stupnjevi,minute,sekunde
# Rješenje:
# Koordinate tražene točke: E=459762.485, N=5070616.676
#-----
# Izračunaj
# Eb-Ea
# Nb-Na
# A=Na*tan fa
# B=Nb*tan fb
# C=tan fa - tan fb
# N=((Eb-Ea) + Na*tan fa - Nb*tan fb)/(tan fa - tan fb)
# D=(N-Na)*tan fa
# F=(N-Nb)*tan fb
# E= Ea + (N-Na)*tan fa
# E= Eb + (N-Nb)*tan fb
```


Presijecanje naprijed

Napiši program temeljem predloženih formula.

	E	N
T _a	459695.45	5070674.54
T _b	459699.86	5070545.20



ϕ_a	130	47	58
ϕ_b	41	13	26



2.		
A	(Eb-Ea)-(Nb-Na) tg ϕ_b	117.7333966
B	(Eb-Ea)-(Nb-Na) tg ϕ_a	-145.4271354
C	tg ϕ_a - tg ϕ_b	-2.034704429
	$\Delta Na = A/C$	-57.86265312
	$\Delta Nb = B/C$	71.47334688
	$\Delta Ea = \Delta Na \cdot \text{tg } \phi_a$	67.03584292
	$\Delta Eb = \Delta Nb \cdot \text{tg } \phi_b$	62.6228429

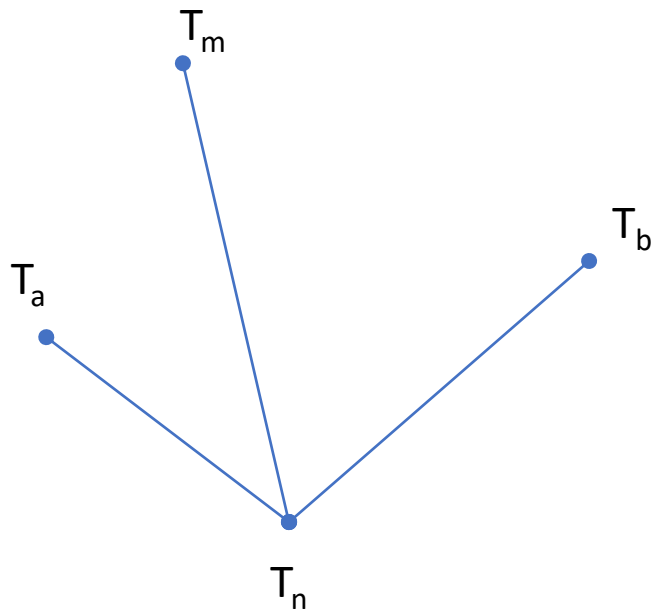
E = Ea + ΔEa	459,762.485
E = Eb + ΔEb	459,762.485
N = Na + ΔNa	5,070,616.676
N = Nb + ΔNb	5,070,616.676

© ASlavicek, 2021. slavicek@geoskola.hr

<https://geoskolazg.weebly.com/triangulacija.html>

Presijecanje natrag

Napiši program temeljem predloženih formula.



Presjek natrag

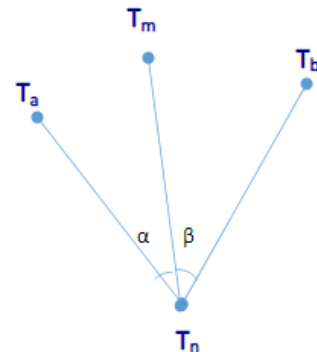
Metoda Cassinia

	E	N
T _a		
T _m		
T _b		

Em-Ea	
Em-Eb	
Nm-Na	
Nm-Nb	

α		
β		

Izračunaj (0/1)



$k_1 = (E_m - E_a) - (N_m - N_a) \operatorname{ctg} \alpha$	
$k_2 = (N_m - N_a) + (E_m - E_a) \operatorname{ctg} \alpha$	
$k_3 = (E_m - E_b) + (N_m - N_a) \operatorname{ctg} \beta$	
$k_4 = (N_m - N_b) - (E_m - E_b) \operatorname{ctg} \beta$	
$n = - (k_1 - k_3) / (k_2 - k_4)$	
$a = k_1 + nk_2$	
$a = k_3 + nk_4$	
$m = - (n^2 + 1)$	
$\Delta E_m = (a/m)$	
$\Delta N_m = (a/m) * n$	

$E_n = E_m + \Delta E_m$	
$N_n = N_m + \Delta N_m$	

© ASlaviček, 2021.

slavicek@geoskola.hr

<https://geoskolazg.weebly.com/geodetska-ra269unanija.html>

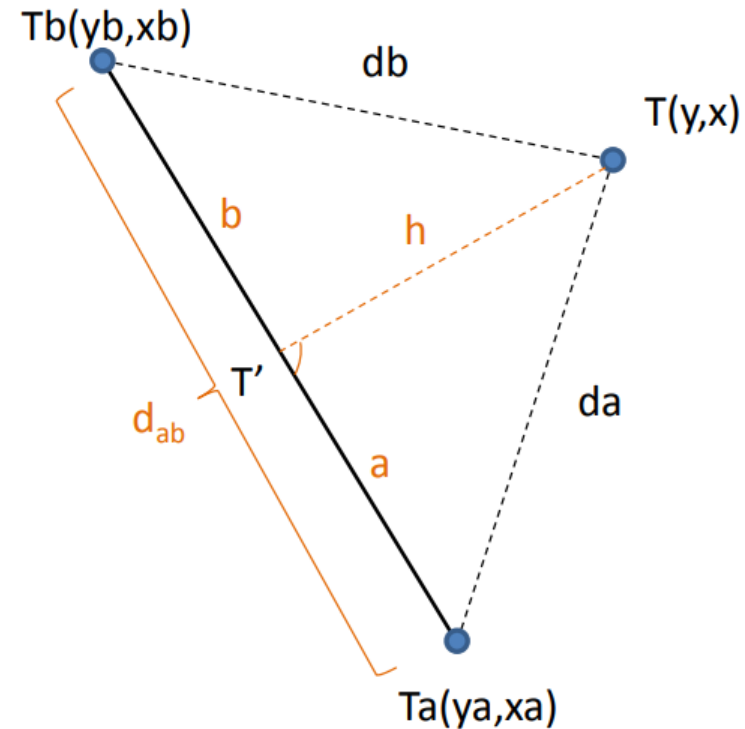
Lučni presjek

$$1 \quad \frac{a+b}{2} = \frac{1}{2} \sqrt{(yb-ya)^2 + (xb-xa)^2}$$

$$2 \quad \frac{a-b}{2} = \frac{(da+db)(da-db)}{2(a+b)}$$

Iz jednadžbi (1) i (2) proizlazi:

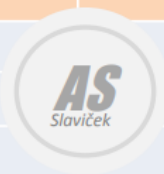
$$3 \quad a = \frac{a+b}{2} + \frac{a-b}{2} \quad b = \frac{a+b}{2} - \frac{a-b}{2}$$



[Lučni presjek \(weebly.com\)](http://weebly.com)

LUČNI PRESJEK

	ya	1258,64	xa		1568,35
	yb	921,52	xb		1763,67
	yb-ya	-337,12	xb-xa		195,32
	d=(a+b)	389,614934			
①	(a+b)/2=	194,807467			
	da=	276,16	db=		336,32
②	(a-b)/2=	-47,29			
③	a=	147,52			
3	b=	242,09			
	h ² =da ² -a ²	54501,81	h ² =db ² -b ²		54501,81
④	h	233,46	h		233,46
Računanje koordinata detaljne točke - apscisa a i ordinata o (h)					
	PREDZNAK = ordinata o (h) nalazi se s lijeve strane =1, a s desne strane -1				-1
⑤	p = (yb-ya)/(a+b)	-0,86526	p ²		0,74868278
5	q = (xb-xa)/(a+b)	0,501315	q ²		0,25131722
			p ² + q ²		1
⑥	y_T	1248,03	x_T		1844,31
	Kontrola	d _a	276,16	d _b	336,32



$$d = (a + b) = \sqrt{(yb - ya)^2 + (xb - xa)^2}$$

$$\frac{a + b}{2} = \frac{1}{2} \sqrt{(yb - ya)^2 + (xb - xa)^2} \quad \text{①}$$

$$\frac{a - b}{2} = \frac{(da + db)(da - db)}{2(a + b)} \quad \text{②}$$

$$a = \frac{a+b}{2} + \frac{a-b}{2} \quad b = \frac{a+b}{2} - \frac{a-b}{2} \quad \text{③}$$

$$h = \sqrt{da^2 - a^2} = \sqrt{db^2 - b^2} \quad \text{④}$$

$$\frac{yb - ya}{a + b} = p \quad \frac{xb - xa}{a + b} = q \quad \text{⑤}$$

$$y_T = y_a + a \cdot p - h \cdot q \quad x_T = x_a + a \cdot q + h \cdot p \quad \text{⑥}$$

Modul math

Python
Moduli

TAHIMETRIJA

Računanje koordinata točaka polarnom metodom - "online obrazac".

Autor: Armando Slaviček, 2021.; mail: slavicek@geoskola.hr



RAČUNANJE KOORDINATA TOČAKA POLARNOM METODOM

A. Slaviček

Staja- lište	Broj točk e	Orijentacija (β) Hz			Vertikalni kut Vk			d_{kosa} (m)	$d_{hor} = d_k * \sin V_k$	$v_i = v + \beta_i$	$\Delta E_i = d_i * \sin v_i$	$\Delta N_i = d_i * \cos v_i$	$\Delta h = d_{ki} * \cos V_k$	$E_n = E_{ST} + \Delta E_i$	$N_n = N_{ST} + \Delta N_i$	$H_n = H_{ST} + \Delta h + i - s$	Broj točke		
		°	'	''	°	'	''			°	'	''							
PT1														5,567,981.03	5,074,589.70	179.76	PT1		
Ori.	PT2	0	00	00						158	30	48		5,567,997.24	5,074,548.52	179.12	PT2		
<i>i</i> =	5	7	47	55	89	22	32	27.052	27.050	166	18	43	6.40	-26.28	0.29	5,567,987.43	5,074,563.42	179.75	5
1.70	6	297	42	10	88	58	00	18.984	18.981	96	12	58	18.87	-2.06	0.34	5,567,999.90	5,074,587.64	179.80	6
<i>s</i> =	7	294	19	55	88	57	27	18.483	18.480	92	50	43	18.46	-0.92	0.34	5,567,999.49	5,074,588.78	179.80	7
2.00	8	293	07	40	87	56	32	17.722	17.711	91	38	28	17.70	-0.51	0.64	5,567,998.73	5,074,589.19	180.10	8
	9	296	01	13	87	44	47	15.823	15.811	94	32	01	15.76	-1.25	0.62	5,567,996.79	5,074,588.45	180.08	9
	10	298	29	38	88	43	49	15.476	15.472	97	00	26	15.36	-1.89	0.34	5,567,996.39	5,074,587.81	179.80	10
slavicek@geoskola.hr																			



© Armando Slaviček, 2021.

Napiši programe koji će računati:

- Horizontalnu duljinu
- Smjerni kut
- Koordinatne razlike (ΔE , ΔN)
- Δh
- E, N i H neke točke

Moduli random

Funkcije za generiranje slučajnih brojeva.

randint (a,b) – vraća slučajni broj n koji je $a \leq n \leq b$

```
>>>
>>> from random import *
>>> randint(0,20)
1
>>> randint(0,20)
2
>>> randint(0,20)
11
>>> randint(0,20)
17
>>> # slučajni cijeli broj u intervalu [0,20]
>>> .
```



Modul random

random () – vraća slučajni realni broj n koji je $0.0 \leq n < 1.0$

```
>>> random()  
0.84310542597082  
>>> random()  
0.49493221391364595  
>>> random()  
0.3689900773587699  
>>> random()  
0.36669170020503505  
>>> random()  
0.2127785575693547  
>>>
```

Moduli – zbirke funkcija

uniform (a,b) – vraća slučajni realni broj n koji je $a \leq n \leq b$
ako je $a \leq b$ ili je $b \leq n \leq a$ ako je $b < a$

```
>>> uniform(10, 50)
46.754826497980545
>>> uniform(10, 50)
16.110916946170857
>>> uniform(10, 50)
13.850432684940298
>>> uniform(10, 50)
43.53364693269026
>>> uniform(10, 50)
26.143487363386818
>>>
```



Moduli – zbirke funkcija

sample (N,k) – vraća listu od k jedinstvenih elemenata iz liste N

```
>>> # definicija liste koja sadrži 50 brojeva
>>> # od 0 do 49
>>> brojevi = [i for i in range (50)]
>>> sample (brojevi,7)
[46, 43, 21, 12, 38, 24, 40]
>>> sample (brojevi,3)
[34, 39, 4]
>>> sample (brojevi,15)
[26, 1, 6, 27, 16, 18, 8, 48, 37, 17, 35, 44, 30, 2, 20]
>>> sample (brojevi,21)
[36, 8, 10, 3, 42, 37, 9, 0, 14, 38, 17, 44, 20, 35, 28, 33, 43,
22, 46, 29, 39]
>>> |
```



Modul random

```
# ASlavicek
# Pogodi broj
from random import *
print('Pogodi broj u intervalu: 0-20')
zamisljen_broj=randint(0,20)
broj=int(input('Traženi broj je = '))

while zamisljen_broj != broj:
    print('Nisi pogodio')
    broj=int(input('Trazeni broj je = '))

print('Pogodio si!, Bravo!!!')
```



Modul random

```
# ASlavicek
# Pogodi broj. Omogući korisniku pomoć pri rješavanju.
# Je li traženi broj manji ili veći od traženog?
from random import *
print('Pogodi broj u intervalu: 0-100')
zamisljen_broj=randint(0,100)
broj=int(input('Traženi broj je = '))

while zamisljen_broj != broj:
    print('Nisi pogodio')
    if zamisljen_broj>broj:
        print("Broj je veći.")
    else:
        print("Broj je manji.")

    broj=int(input('Trazeni broj je = '))

print('Pogodio si!, Bravo!!!')
```





Zahvalujem na pažnji.

A. Slavicek

