Változók, alapműveletek

Oliver Kiss
Central European University

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1 Változók típusai

[1]:
```
# Kommentet kettőskereszt után lehet írni, nem lesz végrehajtva
```

[2]:
```
# Cella végrehajtása és következő cellára ugrás Shift + Enter
```

[3]:
```
# Cella végrehajtása de cellában maradás Ctrl + Enter
```

[4]:
```
# Értékadás
a = 5
```

[5]:
```
type(a)
```

[5]:
```
int
```

[6]:
```
b = 3.4
```

[7]:
```
type(b)
```

[7]:
```
float
```

[8]:
```
c = True
```

[9]:
```
type(c)
```

[9]:
```
bool
```

[10]:
```
d = False
```

[11]:
```
type(d)
```

[11]:
```
bool
```

[12]:
```
e = "alma"
```

[13]:
```
type(e)
```

[13]:
```
str
```

[14]:
```
f = 'narancs'
```

[15]:
```
type(f)
```

[15]:
```
str
```

[16]:
```
# Újabb értékadás felülír
f = 5
```

[17]:
```
f
```

[17]:
```
5
```

[18]:
```
type(f)
```

[18]:
```
int
```

[19]:
```
# Többszörös értékadás
g, h = 5, "paprika"
```

[20]:
```
g
```

[20]:
```
5
```

[21]:
```
h
```

[21]:
```
'paprika'
```

[22]:
```
# Kiértékelés
i = 7+4
```

[23]:
```
i
```

[23]:
```
11
```

[24]:
```
j = i+10
```

[25]:
```
j
```

[25]:
```
21
```

[26]:
```
type(j)
```

[26]:
```
int
```

[27]:
```
k = j + 3.4
```

[28]:
```
k
```

[28]:
```
24.4
```

[29]:
```
type(k)
```

[29]:
```
float
```

[30]:
```
# Bonyolultabb stringek
a = 'Ez egy szöveg \n sortöréssel'
```

[31]:
```
a
```

[31]:
```
'Ez egy szöveg \n sortöréssel'
```

[32]:
```
print(a)
```

```
Ez egy szöveg
 sortöréssel
```

[33]:
```
a = '''Ez
egy
több
soros
szöveg'''
```

[34]:
```
a
```

[34]:
```
'Ez\negy\ntöbb\nsoros\nszöveg'
```

[35]:
```
print(a)
```

```
Ez
egy
több
soros
szöveg
```

2 Alapműveletek változókkal

[36]:
```
int1 = 3
int2 = 4
float1 = 3.2
float2 = 5.6
bool1 = True
```

```
bool2 = False
str1 = 'alma'
str2 = 'korte'
str3 = '5'
str4 = '3.1'
str5 = 'True'
str6 = 'False'
```

2.1 Összeadás - type függő

[37]:
```
a = int1+int2
type(a)
```

[37]:
```
int
```

[38]:
```
a = int1+float1
type(a)
```

[38]:
```
float
```

[39]:
```
a = int1+bool1
type(a)
```

[39]:
```
int
```

[40]:
```
a
```

[40]:
```
4
```

[41]:
```
a = int1+str1
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
/tmp/ipykernel_31455/3362671871.py in <module>
----> 1 a = int1+str1

TypeError: unsupported operand type(s) for +: 'int' and 'str'
```

[ ]:
```
a = int1+str3
```

Stringet számmal nem adhatunk össze (számként reprezentált az int, float és bool), de stringeket konkatenálhatunk

[ ]:
```
a = str1+str2
```

[42]:
```
a
```

[42]:
```
4
```

[43]:
```
type(a)
```

[43]:
```
int
```

2.2 Változó transzformálás

[44]:
```
int(str3)
```

[44]:
```
5
```

[45]:
```
float1 + int(str3)
```

[45]:
```
8.2
```

[46]:
```
float1 + int(str4)
```

```
---------------------------------------------------------------------------
ValueError                                Traceback (most recent call last)
/tmp/ipykernel_31455/1836567247.py in <module>
----> 1 float1 + int(str4)

ValueError: invalid literal for int() with base 10: '3.1'
```

[47]:
```
float1 + float(str3)
```

[47]:
```
8.2
```

[48]:
```
int(True)
```

[48]:
```
1
```

[49]:
```
int(False)
```

[49]:
```
0
```

[50]:
```
float(True)
```

[50]:
```
1.0
```

[51]:
```
float(False)
```

[51]:
```
0.0
```

[52]:
```
bool(1)
```

[52]: True

[53]:
```
bool(0)
```

[53]: False

[54]:
```
bool(10)
```

[54]: True

[55]:
```
bool(0.5)
```

[55]: True

[56]:
```
bool(-1)
```

[56]: True

[57]:
```
bool(-4.56)
```

[57]: True

[58]:
```
bool('alma')
```

[58]: True

[59]:
```
bool('')
```

[59]: False

[60]:
```
str(True)
```

[60]: 'True'

[61]:
```
str(False)
```

[61]: 'False'

[62]:
```
str(3.4)
```

[62]: '3.4'

2.3 Kivonás

Számokkal és boolean változókkal működik gond nélkül

[63]:
```
float1-int2-bool1-bool2-float2
```

[63]: -7.3999999999999995

Stringet, illetve stringből nem lehet kivonni

[64]:
```
str1-str2
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
/tmp/ipykernel_31455/533321809.py in <module>
----> 1 str1-str2

TypeError: unsupported operand type(s) for -: 'str' and 'str'
```

[65]:
```
float1-str1
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
/tmp/ipykernel_31455/1187642493.py in <module>
----> 1 float1-str1

TypeError: unsupported operand type(s) for -: 'float' and 'str'
```

[66]:
```
str1-float1
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
/tmp/ipykernel_31455/790374843.py in <module>
----> 1 str1-float1

TypeError: unsupported operand type(s) for -: 'str' and 'float'
```

[67]:
```
int1-str1
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
/tmp/ipykernel_31455/2973981053.py in <module>
----> 1 int1-str1

TypeError: unsupported operand type(s) for -: 'int' and 'str'
```

[68]:
```
str1-int1
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
```

```
/tmp/ipykernel_31455/2808133596.py in <module>
----> 1 str1-int1

TypeError: unsupported operand type(s) for -: 'str' and 'int'
```

[69]:
```
bool1-str1
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
/tmp/ipykernel_31455/3363146139.py in <module>
----> 1 bool1-str1

TypeError: unsupported operand type(s) for -: 'bool' and 'str'
```

[70]:
```
str1-bool1
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
/tmp/ipykernel_31455/2286599795.py in <module>
----> 1 str1-bool1

TypeError: unsupported operand type(s) for -: 'str' and 'bool'
```

2.4 Szorzás

[71]:
```
int1*int2
```

[71]: 12

[72]:
```
int1*float1
```

[72]: 9.600000000000001

Látható, hogy a számítógép közelíti az eredményt, nem feltétlenül pontos. Az úgynevezett computer precision hardver és beállításfüggő.

[73]:
```
float1*float2
```

[73]: 17.919999999999998

[74]:
```
int1*bool1
```

[74]: 3

[75]:
```
int1*bool2
```

[75]:
```
0
```

[76]:
```
float1*bool1
```

[76]:
```
3.2
```

[77]:
```
float1*bool2
```

[77]:
```
0.0
```

[78]:
```
str1*str2
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
/tmp/ipykernel_31455/4199405932.py in <module>
----> 1 str1*str2

TypeError: can't multiply sequence by non-int of type 'str'
```

[79]:
```
str1*bool1
```

[79]:
```
'alma'
```

[80]:
```
str1*bool2
```

[80]:
```
''
```

[81]:
```
str1*int1
```

[81]:
```
'almaalmaalma'
```

[82]:
```
int1*str1
```

[82]:
```
'almaalmaalma'
```

[83]:
```
str1*float1
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
/tmp/ipykernel_31455/4192844329.py in <module>
----> 1 str1*float1

TypeError: can't multiply sequence by non-int of type 'float'
```

String csak integerrel szorozható, a bool integerként reprezentált, így működik.

2.5 Osztás

[84]:
```
int1/int2
```

[84]:
```
0.75
```

[85]:
```
float1/float2
```

[85]:
```
0.5714285714285715
```

[86]:
```
int1/float1
```

[86]:
```
0.9375
```

[87]:
```
float1/int1
```

[87]:
```
1.0666666666666667
```

[88]:
```
int1/bool1
```

[88]:
```
3.0
```

[89]:
```
int1/bool2
```

```
---------------------------------------------------------------------------
ZeroDivisionError                         Traceback (most recent call last)
/tmp/ipykernel_31455/14314200.py in <module>
----> 1 int1/bool2

ZeroDivisionError: division by zero
```

[90]:
```
float1/bool1
```

[90]:
```
3.2
```

[91]:
```
float1/bool2
```

```
---------------------------------------------------------------------------
ZeroDivisionError                         Traceback (most recent call last)
/tmp/ipykernel_31455/911925175.py in <module>
----> 1 float1/bool2

ZeroDivisionError: float division by zero
```

[92]:
```
bool1/int1
```

[92]: 0.3333333333333333

[93]:
```
bool2/float1
```

[93]: 0.0

Stringet nem lehet osztani és nem lehet osztó.

[94]:
```
int1/str1
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
/tmp/ipykernel_31455/698043087.py in <module>
----> 1 int1/str1

TypeError: unsupported operand type(s) for /: 'int' and 'str'
```

[95]:
```
str1/int1
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
/tmp/ipykernel_31455/2323581952.py in <module>
----> 1 str1/int1

TypeError: unsupported operand type(s) for /: 'str' and 'int'
```

[96]:
```
float1/str1
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
/tmp/ipykernel_31455/2218432358.py in <module>
----> 1 float1/str1

TypeError: unsupported operand type(s) for /: 'float' and 'str'
```

[97]:
```
str1/float1
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
/tmp/ipykernel_31455/2050698186.py in <module>
----> 1 str1/float1

TypeError: unsupported operand type(s) for /: 'str' and 'float'
```

[98]:
```
bool1/str1
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
/tmp/ipykernel_31455/2166117422.py in <module>
----> 1 bool1/str1

TypeError: unsupported operand type(s) for /: 'bool' and 'str'
```

[99]:
```
str1/bool1
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
/tmp/ipykernel_31455/1210716140.py in <module>
----> 1 str1/bool1

TypeError: unsupported operand type(s) for /: 'str' and 'bool'
```

2.6 Hatványozás

[100]:
```
float1**int1
```

[100]: 32.76800000000001

[101]:
```
pow(float1,int1)
```

[101]: 32.76800000000001

[102]:
```
int1**float1
```

[102]: 33.63473536961897

[103]:
```
float2**bool2
```

[103]: 1.0

Stringet nem hatványozunk és nem lehet kitevő.

[104]:
```
str1**3
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
/tmp/ipykernel_31455/3127011896.py in <module>
----> 1 str1**3
```

```
TypeError: unsupported operand type(s) for ** or pow(): 'str' and 'int'
```

[105]:
```
3**str1
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
/tmp/ipykernel_31455/1721925106.py in <module>
----> 1 3**str1

TypeError: unsupported operand type(s) for ** or pow(): 'int' and 'str'
```

2.7 Modulus, törtrész

[106]:
```
5 % 3
```

[106]: 2

[107]:
```
3.5 % 1.7
```

[107]: 0.10000000000000009

[108]:
```
-2.5 % 2.3
```

[108]: 2.0999999999999996

2.8 Alsó egészrész

[109]:
```
5 // 2
```

[109]: 2

[110]:
```
3.5 // 1.1
```

[110]: 3.0

[111]:
```
-5 // 2
```

[111]: -3

Alsó egészrész * osztó + törtrész = osztandó

[112]:
```
(-72.242//2.3)*2.3+(-72.242%2.3)
```

[112]: -72.242

2.9 Logikai

[113]:
```
# And: Akkor és csak akkor igaz, ha mindegyik igaz
True and True
```

[113]: True

[114]:
```
True and False
```

[114]: False

[115]:
```
False and False
```

[115]: False

[116]:
```
True and True and True
```

[116]: True

[117]:
```
True and True and False
```

[117]: False

[118]:
```
# Or: Akkor igaz, ha legalább az egyik igaz
True or True
```

[118]: True

[119]:
```
True or False
```

[119]: True

[120]:
```
False or False
```

[120]: False

[121]:
```
True or False or False
```

[121]: True

[122]:
```
# Not: Tagadás
not True
```

[122]: False

[123]:
```
not False
```

[123]: True

[124]:
```
not False or False
```

[124]: True

[125]:
```
not True or False
```

[125]: False

2.10 Relációk

[126]:
```
int1>int2
```

[126]: False

[127]:
```
int1<=int2
```

[127]: True

[128]:
```
float1<int2
```

[128]: True

[129]:
```
float1>=int1
```

[129]: True

[130]:
```
float1>bool1
```

[130]: True

[131]:
```
float1>str1
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
/tmp/ipykernel_31455/3186386486.py in <module>
----> 1 float1>str1

TypeError: '>' not supported between instances of 'float' and 'str'
```

[132]:
```
str1>str2
```

[132]: False

[133]:
```
# Stringek lexikografikusan kerülnek sorbarendezésre
```

[134]:
```
float1==float1
```

[134]: True

[135]:
```
float1!=float2
```

[135]: True

3 Kiértékelés sorrendje

[136]:
```
# Balról jobbra, magasabb rendű műveletek elsőbbséget élveznek, először
↪zárójelen belül van kiértékelés
```

[137]:
```
3+2*2
```

[137]: 7

[138]:
```
(3+2)*2
```

[138]: 10

[139]:
```
(3+4)**False
```

[139]: 1

[140]:
```
3**2*(True or False)
```

[140]: 9

[141]:
```
3**2*(True or False)*2
```

[141]: 18

[142]:
```
3**2*((True or False)*2)
```

[142]: 18

[143]:
```
3**(2*(True or False))*2
```

[143]: 18

[144]:
```
3**(2*((True or False)*2))
```

[144]: 81