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value/object is interchangeable, assigned to variable

type of value/object: `print(type())`

type provides class: int, str, math, float, character

integers with commas are not legal (ie 42,000 -- > 42 0)

integers with commas are treated as pair values

<https://docs.python.org/2/library/stdtypes.html>

### Functions and Parameters

#### Function Definition Syntax

`def name( parameters ): statements`

The syntax for a function definition is:

### Functions and Parameters

#### Function Style

```
def header():  
    indent 4 spaces for  
statements
```

### Compound Statements

used for conditional execution:

```
if_stmt ::= "if" expression ":"  
suite  
( "elif" expression ":" suite ) *  
["else" ":" suite]
```

### Compound Statements

[https://docs.python.org/2/reference/compound\\_stmts.html](https://docs.python.org/2/reference/compound_stmts.html)

### Boolean Operators:

<https://docs.python.org/2/reference/expressions.html#booleans>

### Chatbot

<https://pypi.org/project/ChatterBot/>  
<https://chatterbot.readthedocs.io/en/stable/faq.html>

<https://chatbotmagazine.com/chatbot-report-2018-global-trends-and-analysis-4d8bbe4d924b>

<https://medium.com/analytics-vidhya/building-a-simple-chatbot-in-python-using-nltk-7c8c8215ac6e>

[https://www.emeraldinsight.com/doi/abs/10.1108/07378831211213238?](https://www.emeraldinsight.com/doi/abs/10.1108/07378831211213238?mbSc=1&fullSc=1&fullSc=1&journalCode=lht)

[mbSc=1&fullSc=1&fullSc=1&journalCode=lht](https://www.emeraldinsight.com/doi/abs/10.1108/07378831211213238?mbSc=1&fullSc=1&fullSc=1&journalCode=lht)

<http://interactivepython.org/runestone/static/thinkcspy/Selection/OmittingtheelseClauseUnarySelection.html>

<http://interactivepython.org/runestone/static/thinkcspy/Selection/ConditionalExecutionBinarySelection.html>

### Bugs

error: variables must already have values in order to be used on the rhs side

common errors: parse error (55%) type (15%) name (11%) value(10%)

other errors: URI, Token, Syntax, TimeLimit, Indentation, Attribute, Import, Index

ex's: parse: missing bracket, interprets as another parameter to function

EOF...: python got to the end of the file and was still looking for something

ValueError: when you pass a parameter to a function and the function - the type you pass is not the expected one

Finding clues: print values and types in statement causing error

Name Error: you already used that name, wrong name or input etc

### Bugs

1. Adding two strings is not the same as adding two integers (be aware to convert user inputs)
2. Test boundary conditions: inside, outside and parameters themselves .
3. Deal with input values outside the parameter: use modulo operator  
Example: use `%24` to keep within parameters (0,23)!  
`current_time= int(input("input hrs between 0-23"))`  
`wait_time= int(input("how many hours do you want to wait?"))`  
`final = (current_time + wait_time) % 24`

### Creating an Algorithm

1. Design the algorithm (instructions with #)
2. Input code under hashes

### Modules

modules are data objects - module objects contain other python elements

1. import module as whatever

to use something within a module, use dot notation

`turtle.Turtle` : In the module `turtle`, access the Python element called `Turtle`

others: `math`, `random`, `pi`, `e`

example: `math.sqrt(x)`,  
`math.sin(math.radians(degrees))`, `math.pi` will print 3.14..., `math.e` will print 2.718

`random.random()` gives random number between [0.0, 1.0)

`random.randrange(x,y)`

other modules to check out: `game`

Module Index: <https://docs.python.org/3/py-modindex.html>



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### Examples

```
import random
howmany = 10
for counter in range(howmany):
    arandom = random.random()
    print(arandom) #prints 10 random numbers
```

### Important Section

Built In Types: Truth Values, Boolean Operators, Comparisons, (Bitwise operators), Additional methods on: integers, floats, strings, (Iterator and Generator Types), Sequence (str, list, tuple etc) Types, String **Methods**, String formatting, etc :

<https://docs.python.org/2/library/stdtypes.html>

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