Introduction to Algorithms

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Variables and Primitive Data Types

- Integers
- Floating point/real numbers
- Booleans
- Characters and strings

Variables point to some place in memory where a representation of an abstract data type is stored and may be recalled.

```
Var = 10
# Var is assigned a value of 10, stored as an integer
# Var points to an address in memory where a binary
representation of the integer 10 is stored
```

Lists

- Ordered collections of arbitrary objects
- Accessed by offset
- Mutable, nestable
- Basic list operations (append, index, pop, stack operations, lengths)

```
List = [1, 3, 5, 10]
print(List[2])
List.append('cgat')
len(List)
L.pop(1)
```

Conditionals

- Different actions are required by different inputs
- if, else, elif typically is all we need...

```
if test:
  statement
elif test2:
  statement2
else:
  statement3
```

Loops

```
for target in iterable_object:
  statement1
  statement2
  ...

for i in range(len(List)):
  print “the array index of the value”, List[i], “is”, i
```

Loop Control

- `Break` statements immediately exits an enclosing loop
- `Continue` statements immediately begins the next iteration of the loop
- `while, until` control flow constructs can be made equivalent to the standard `do, for` loops using loop control

```
[ expression for item in list if conditional ]
```

```
for item in list:
  if conditional:
    expression
  elif conditional:
    break
```

Functions

```
def validate (seq):
  SEQ = seq.upper()
  return len(SEQ) == (SEQ.count('T') + SEQ.count('C') + \
                      SEQ.count('A') + SEQ.count('G')

L = "TCGA"
S = "TUAM"
validate(L)
validate(S)
```