Algorithmic Approaches for Biological Data, Lecture #15

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Outline

- Sorting by Keys

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- Lambda Functions

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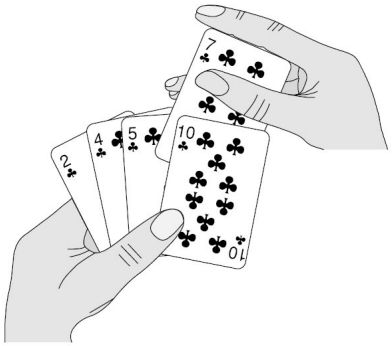
- Lambda Functions
- Recursion

Sorting

- Input: List of n items



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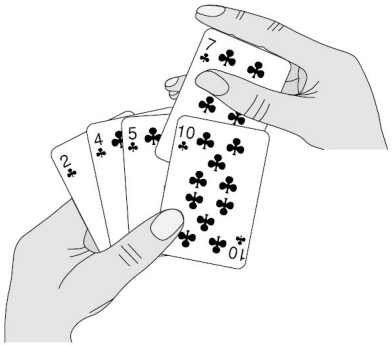

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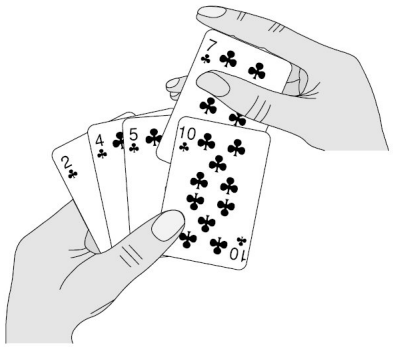

- Input: List of n items
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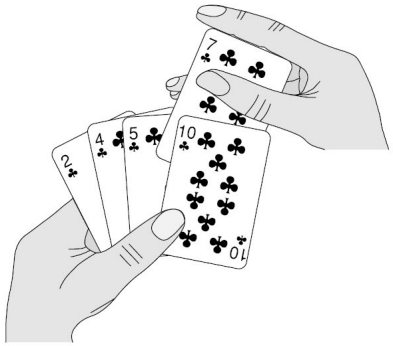
- Recap: Some common approaches:
  - Take the largest card and move to the end. Repeat with next largest... BubbleSort
  - Start a new list and insert each card into it to keep in order...InsertionSort
  - Divide the cards in half. Sort each half and merge sorted results together....MergeSort
- All need to compare values and re-order in some way.

Built-in Sorting Functions



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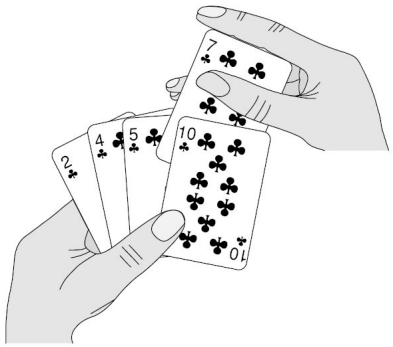

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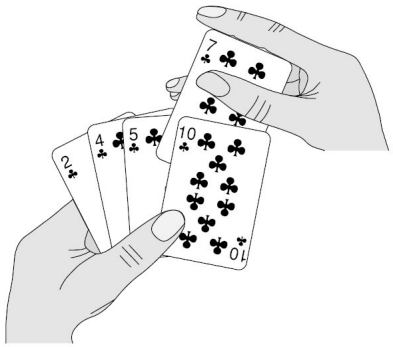

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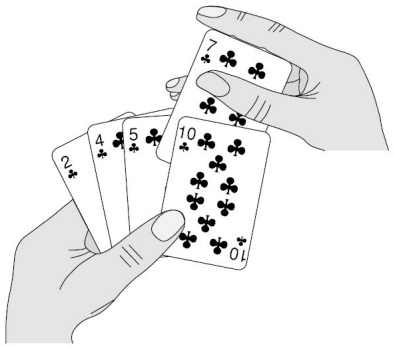

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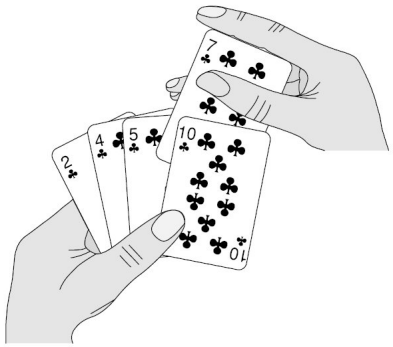

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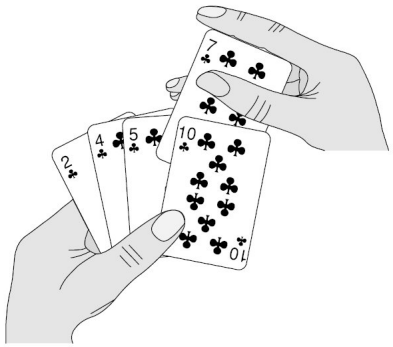

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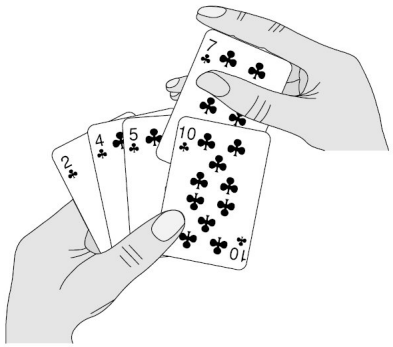

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- Can use `sorted()` on tuples
  (Cannot use `.sort()` since tuples are not mutable.)

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In Pairs

In pairs/triples, work out (and then try at the shell, `moreSorting.py` on webpage):

1. How do you sort a hand of cards, first by suit, then by rank? Write your algorithm in pseudocode.
2. What does the following do:

```
anon = lambda x:  x+"mouse "
print anon("a ")
print anon( anon("anony") )

add = lambda x,y:  x+y
print add("a", "mouse")
print add(3,5)

def cat(s, f):
    return f(s)

print cat("mighty", anon)
print cat("mighty",
          lambda s:  add(s,"mouse"))
```

3. What does the following do:

```
print sorted("A man a plan a canal:
       Panama".split(), key=str.lower)
```

4. What does the following do:

```
#We'll use 11 = Jack, 12 = Queen,
# 13 = King, 1 = Ace, and
# C = clubs, D = diamonds, H = hearts, and
# S = spades

cards = [(10, 'H'), (12, 'C'), (2, 'D'),
       (4, 'H'), (2, 'C'), (12, 'S'),
       (13, 'S'), (1, 'C'), (5, 'D'),
       (7, 'H'), (8,'D'), (7,'C'),
       (9,'D')]

print "Original list:", cards
print "Plain sorted:", sorted(cards)
print "Sorted by last value:", sorted(cards,
key = lambda card:  card[-1])
print "Sorted by suit, then rank:",
   sorted(cards,
          key=lambda card:(card[1],card[0]))
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```
def factR(n):
    if n ¡= 1:
        return 1
    else:
        return n*factR(n-1)
```

```
def factI(n):
    prod = 1
    for i in range(2,n):
        prod = i*prod
    return prod
```

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