Elementary Sorts

# Motivation

* Often method of choice in special situations
* Basis for developing better algorithms

# Selection Sort

* Repeatedly selection the smallest remaining item.
* Selection sort uses  and exchanges to sort an array of length
* Properties:
  + Insensitive to input (does not consider partially sorted arrays)
  + Exchanges is minimal (no other sorting algorithms has this property)

# Insertion Sort

* Like sorting card hands
* Insertion sort uses and compares exchanges on average.
  + Worst case: and compares exchanges
  + Best case: and compares 0 exchanges
* Properties:
  + Faster for partially sorted arrays (dependence on input)
  + #exchanges = #inversions
  + #compares <= #compares <= #inversions + (N-1)

# Shell Sort

* Extensions of insertion sort. Alowing exchanges that are far apart, producing partially sorted arrays for efficient sorting (desired intermediate state)
* Strongly depends on chosen “increment sequence”