

CMDs 10

11-21-08

## INPUT & OUTPUT REDIRECTION IN UNIX.

% cmd < file

{ EXECUTES CMD, TAKING INPUT  
FROM FILE INSTEAD OF THE  
KEYBOARD.

% cmd > file

{ EXECUTES CMD, SENDING  
OUTPUT TO FILE, INSTEAD  
OF SCREEN

% cmd >> file

{ LIKE >, EXCEPT APPEND INSTEAD  
OF OVERWRITE

% cmd < file1 > file2

{ BOTH INPUT & OUTPUT  
ARE REDIRECTED.

# Selection Sort (in: $n-1, a_1, \dots, a_n$ )

- 1)  $R \leftarrow n$
- 2) while  $R \geq 2$ 
  - 3) find index  $i$  of max element in unsorted section
  - 4) swap  $a_i \leftrightarrow a_R$
  - 5)  $R \leftarrow R - 1$
  - 6) stop

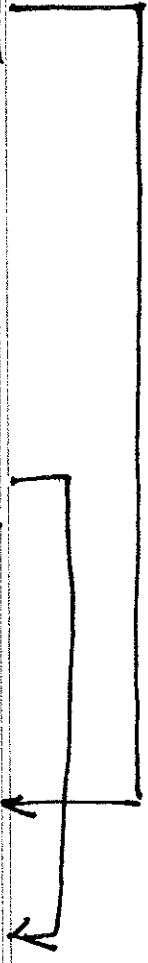
```

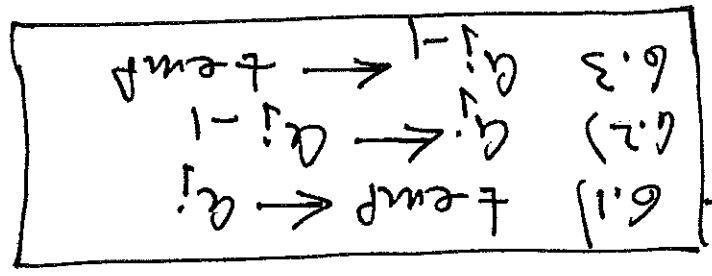
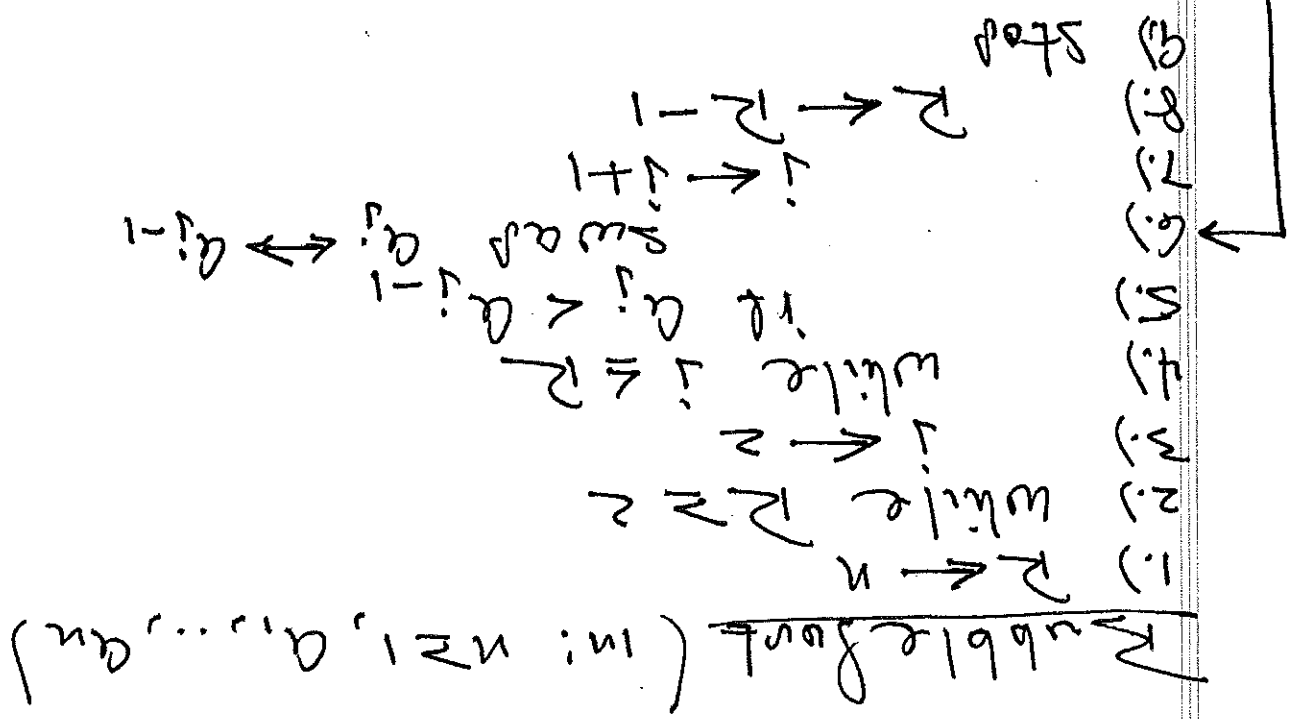
3.1) i ← 1
3.2) i ← 2
3.3) while i ≤ R
3.4) if ai > ai
3.5) i ← i
3.6) i ← i + 1
    
```

```

4.1) temp ← ai
4.2) ai ← aR
4.3) aR ← temp
    
```

See SelectionSort.cpp on  
Wednesday





See BubbleSort.cpp on  
 webpage.

Insertion Sort ( $n \geq 1, a_1, \dots, a_n$ )

```

1) L ← 2
2) while L ≤ n
3)   j ← L
4)   while j ≥ 2 and a_j < a_{j-1}
5)     swap a_j ↔ a_{j-1}
6)     j ← j - 1
7)   L ← L + 1
8) Stop

```

Refine .....

Performance (# of comparisons)

• Selection:  $\frac{1}{2}n^2 - \frac{1}{2}n$     Best  
                    $\frac{1}{2}n^2 - \frac{1}{2}n$     Worst  
                    $\frac{1}{2}n^2 - \frac{1}{2}n$     Avg.

• Bubble:  $\frac{1}{2}n^2 - \frac{1}{2}n$

• Insertion:  $n$      $\frac{1}{2}n^2 - \frac{1}{2}n$      $\frac{1}{4}n^2 + \frac{3}{2}n - \ln(n)$

• Quick:  $\Theta(n)$      $\Theta(n^2)$      $\left\{ \begin{array}{l} \Theta(n \ln(n)) - 4n + 2 \ln(n) \\ \Theta(n \ln(n)) \\ \Theta(n \log n) \end{array} \right.$

• Merge:  $\Theta(n)$      $\Theta(n \log n)$      $\Theta(n \log n)$