CompSci 101
Introduction to Computer Science

April 16, 2015

Prof. Rodger
Announcements

• No Reading or RQ for next time
• Assignment 8 due today, Assignment 9 out
• APT 10 due Tuesday!
• Problem with Final Exam Date? Or have accommodations, must fill out form on course web page to reschedule exam
  – Want to take exam in other section?

• Finish lecture notes from last time
• Today – Sorting how’s
Announcements (cont)

• Regrade for APT in which you added additional call to the function.
• Regrades for Exam 2
  – give to Prof. Rodger
• Be a UTA for CompSci 101
  – Rewarding and learning experience!
  – Form available soon
• Provide comments on Lab UTAs and other UTAs
  – See old announcement on Sakai
• In python:
  – `alist = [8, 5, 2, 3, 1, 6, 4]`
  – `alist.sort()` OR `result = sorted(alist)`
  – Now `alist` OR `result` is `[1, 2, 3, 4, 5, 6, 8]`

• How does one sort elements in order? How does “sort” work?
Selection Sort

• Sort a list of numbers.

• Idea:
  – Repeat
    • Find the smallest element in part of list not sorted
    • Put it where it belongs in sorted order

• Sort example

| Sorted, won’t move final position | ??? |
Question 1 –

• Sort the list of numbers using Selection Sort.
• The body of the loop is one pass.
• Show the elements after each pass.
• [9, 5, 1, 4, 3, 6]
Question 2: Code for Selection Sort

• Snarf the code for today.
• Fill in the missing code for selection sort
• 1) First finish minIndex – returns the index of the minimum element in list items, between “start” and the right end of the list
• 2) Complete the body of the for loop in Selection sort
Bubble Sort

• Sort a list of numbers.
• Idea:
  – Repeat til sorted
    • Compare all adjacent pairs, one at a time. If out of order then swap them
• Sort example

| ??? | Sorted, won’t move final position |
Question 3 -

• Sort the list of numbers using BubbleSort.
• The body of the loop is one pass.
• Show the elements after each pass.
• [9, 5, 1, 4, 3, 6]
Question 4: Code for Bubblesort

- Fill in the missing code for bubblesort
- 1) What is the range of the second for loop?
- 2) Complete the body of the 2cd for loop
Insertion Sort

• Sort a list of numbers.

• Idea:
  – Sort by repeated inserting another element
    • Leftmost element is sorted part of list
    • Insert another element in that sublist keeping it sorted
    • Insert another element in that sublist keeping it sorted
    • Etc.

• Sort example

| Sorted relative to each other | ??? |
Question 5 -

• Sort the list of numbers using InsertionSort.
• The body of the loop is one pass.
• Show the elements after each pass.
• [9, 5, 1, 4, 3, 6]
Question 6: Code for InsertionSort

• Fill in the missing code for insertionsort
• 1) What are the conditions for the while?
• 2) Complete the body of the while
Wrap up Sorting

• Question 7:
  – Compare these three sorts.
    • How are they the same?
    • How are they different?

• Different ways to sort?
  – Over 50 sorting algorithms

• What sorting algorithm does Python sort use?

• Does President Obama know his sorts?

• Sorting animations

http://www.sorting-algorithms.com/
Merge Sort

• Idea: Divide and Conquer
• Divide array into two halves
• Sort both halves (smaller problem)
• Merge the two sorted halves

• Learn about this and other sorts in CompSci 201, also how to analyze them to determine which one works best.
• Timsort
• Shellsort