Exercise

Write an algorithm that asks the user for 10 temperature measurings, and prints out the temperatures entered and their average. For example:

Enter 10 temperatures: 21, 32, 34, 56, 67, 89, 21, 45, 67, 54 The recorded temperatures are: 21, 32, 34, 56, 67, 89, 21, 45, 67, 54. The average is: ...



CS107

Introduction to Computer Science

Lecture 5, 6

An Introduction to Algorithms:

List variables

- Change your previous program so that it handles
 - 20 temperatures
 - 50 temperatures
 - 100 temperatures
 - 1000 temperatures

List variables

- · How to represent inputs of arbitrary size?
- Suppose that we need to read 100 numbers from the user, or 1000, or..
 - we could give each variable a different name...tedious!!

• Use a list variable:

- Variable: list a of size n
- This means that a is a list of n elements: $a_1, a_2, a_3, ..., a_n$
- To read the list from the user use a loop to read each element
- To print the list use use a loop to print each element
- We can treat each element in the list as a variable
 - Set a₃ to 5
 - Set a₄ to a₃ +2
 - If $(a_4 == a_3)$ then print "equal"

List variables

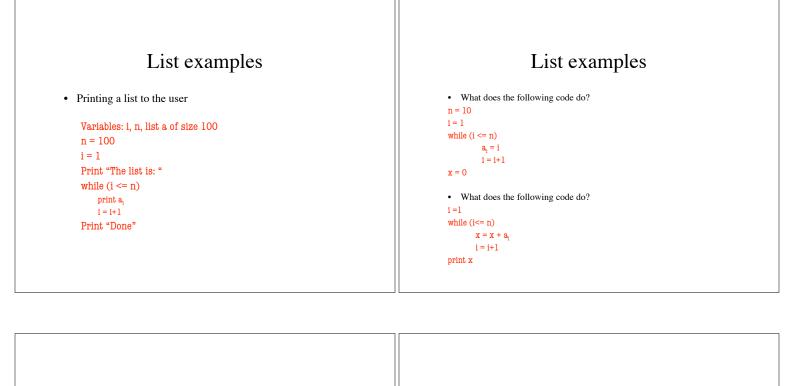
We used to write
Variable: a, b, c, sum, avg, i etc

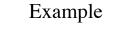
- If we want to use a list we'll write
 - Variable: list a of size 100
 - This tells the "computer" that a is a list variable which can hold 100 items
 - Now we can access any item in the list as a normal variable, by specifying its index
 - Set a₂ to a₉
 - Set i = 10
 - Set a₁ to a₃ +2

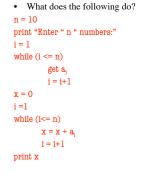
List examples

• Reading a list of 100 elements from the user

Variables: i, n, list a of size 100 Print "Enter 100 elements: " n = 100 i = 1while (i <= n) print "enter next element" get a_1 i = i+1Print "Great, thanks."







Searching

• Problem: Write an algorithm that reads from the user a list of 100 numbers and a target value, and searches to see if any element in the list is equal to the target value. If not, prints "target not found". If yes, prints "target found".

Searching, variations

- Modify your search algorithm so that:
 - It prints the location (i.e. index in the list) where it finds the target
 - It finds only the first occurence of target
 - It finds all occurences of target (and prints their locations)
 - It counts the number of occurences of target in the list
 - It counts how many elements in the list are larger than target

More exercises

- Write an algorithm that reads a list of 100 numbers from the user and
 - prints out the average of all numbers in the list.
 - prints out the largest element in the list
 - prints out the smallest element in the list