

Problem Set 4

- Use a list to solve the following problem: Read in 20 numbers. As each number is read, print it only if it is not a duplicate of a number already read.
- Use a list of lists to solve the following problem. A company has four salespeople (1 to 4) who sell five different products (1 to 5). Once a day, each salesperson passes in a slip for each different type of product sold. Each slip contains:
 - a) The salesperson number.
 - b) The product number.
 - c) The number of that product sold that day.

Thus, each salesperson passes in between 0 and 5 sales slips per day. Assume that the information from all of the slips for last month is available. Write a program that will read all this information for last month's sales and summarize the total sales by salesperson by product. All totals should be stored in list **sales**. After processing all the information for last month, display the results in tabular format, with each of the columns representing a particular salesperson and each of the rows representing a particular product. Cross-total each row to get the total sales of each product for last month; cross-total each column to get the total sales by salesperson for last month. Your tabular printout should include these cross-totals to the right of the totaled rows and at the bottom of the totaled columns.

- A prime integer is any integer greater than 1 that is evenly divisible only by itself and 1. The Sieve of Eratosthenes is a method of finding prime numbers. It operates as follows:
 - a) Create a list with all elements initialized to 1 (true). List elements with prime subscripts will remain 1. All other list elements will eventually be set to zero.
 - b) Starting with list element 2, every time a list element is found whose value is 1, loop through the remainder of the list and set to zero every element whose subscript is a multiple of the subscript for the element with value 1. For list subscript 2, all elements beyond 2 in the list that are multiples of 2 will be set to zero (subscripts 4, 6, 8, 10, etc.); for list subscript 3, all elements beyond 3 in the list that are multiples of 3 will be set to zero (subscripts 6, 9, 12, 15, etc.); and so on.

When this process is complete, the list elements that are still set to 1 indicate that the subscript is a prime number. These subscripts can then be printed. Write a program that uses a list of 1000 elements to determine and print the prime numbers between 2 and 999. Ignore element 0 of the list.

- Sorting data (i.e. placing data into some particular order, such as ascending or descending) is one of the most important computing applications. Python lists provide a **sort** method. In this exercise, readers implement their own sorting function, using the bubble-sort method. In the bubble sort (or *sinking* sort), the smaller values gradually "bubble" their way upward to the top of the list like air bubbles rising in water, while the larger values sink to the bottom of the list. The process that compares each adjacent pair of elements in a list in turn and swaps the elements if the second element is less than the first element is called a pass. The technique makes several passes through the list. On each pass, successive pairs of elements are compared. If a pair is in increasing order, bubble sort leaves the values as they are. If a pair is in decreasing order, their values are swapped in the list. After the first pass, the largest value is guaranteed to sink to the highest index of a list. After the second pass, the second largest value is guaranteed to sink to the second highest index of a list, and so on. Write a program that uses function **bubbleSort** to sort the items in a list.