香 港 大 學

THE UNIVERSITY OF HONG KONG

Bachelor of Engineering

Faculty of Engineering

ENGG1330 Computer Programming I

2023-2024 Semester 2
Mid-term Quiz

Date: 14 March 2024
Duration: 10:40am - 12:10pm (90 minutes)

Important notes

- Answer all the 4 questions.
- Only Python built-in features can be used in your programs. Zero mark will be given to programs that import any modules.
- Unless specified otherwise in the questions, you may assume that all program inputs are valid, and no error handling is required.
- Submit your programs to the corresponding VPLs in the course Moodle.
- There is no limit on number of submissions but only the last submission will be graded.
- To pass a test case, your program must generate output according to the formats stipulated in the questions, e.g., no extra text/space.
- No late submission will be accepted. VPLs will be closed automatically at 12:15pm.
- Format: open Book but Internet searching and crowdsourcing from group messages, online forums or social media, etc. are strictly forbidden.
- You must work on your own and provide your own answers and codes in the quiz.
- You are not allowed to communicate with anyone during the quiz.

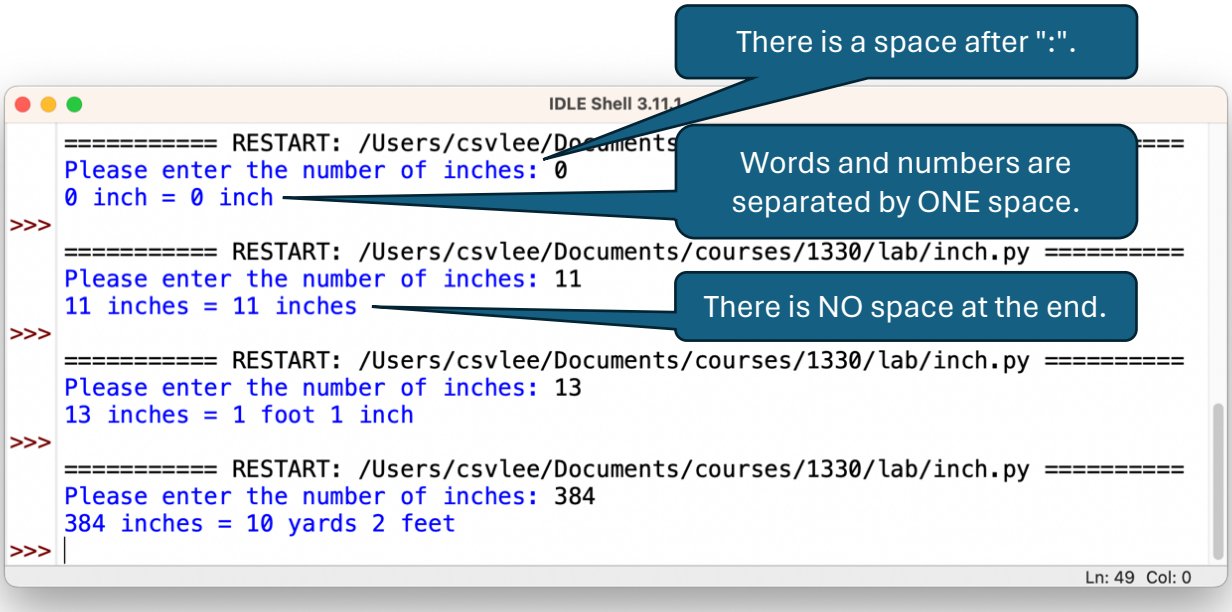
q_vpl_1. [20 marks]

Write a program to input a non-negative integer from user and convert the input in number of inches to number of yards, feet, and inches. Note that 1 yard = 3 feet and 1 foot = 12 inches. The output must conform to the following rules.

a. Special case: when the input is 0, the output is “0 inch = 0 inch”
b. Except for the above special case, don’t display the number ‘0’ and its unit.
c. When the number is one, use the singular unit such as yard, foot, and inch.
d. When the number is more than one, use the plural unit such as yards, feet, and inches.

Option for partial marks: If you don't have enough time to solve the problem, you may choose to do a small version that considers only feet and inches.

Samples

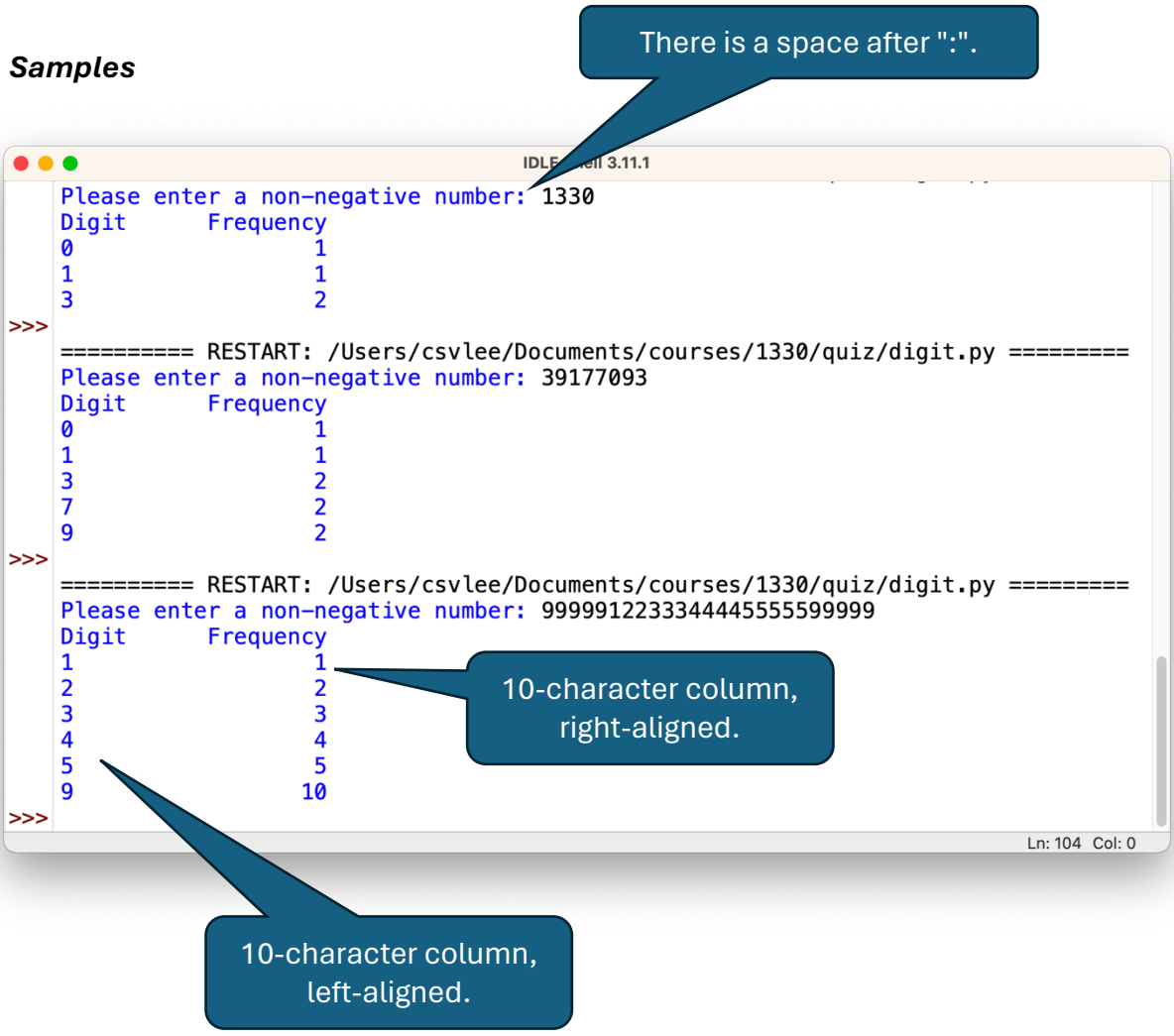


q_vpl_2. [20 marks]

Write a program to input a non-negative integer from user and find the frequency of each digit in the integer. The output must conform to the following rules.

a. Table format with two columns
b. Column width: 10 characters
c. The first column is left-aligned, and the heading is "Digit".
d. The second column is right-aligned, and the heading is "Frequency".
e. The digits and their frequencies are displayed in ascending order of the digit values.
f. Do not display those digits that are not found in the integer.

Samples



q_vpl_3. [30 marks]

There are N (N>1) people standing in a circle and they are labelled 1, 2, ..., N. Everyone participates in a counting game. The person labelled 1 begins the counting from 1 and the next person, i.e., the person labelled 2 continues the counting with the count one greater than the previous one, i.e., 2. When a person's count reaches 3, that person is out of the game and the next person restarts the counting from 1, and so on so forth. The winner is the last person left in the game.

Write a program to input N (number of people playing the game), use the above rules of game to find the winner, and display the label of the winner.

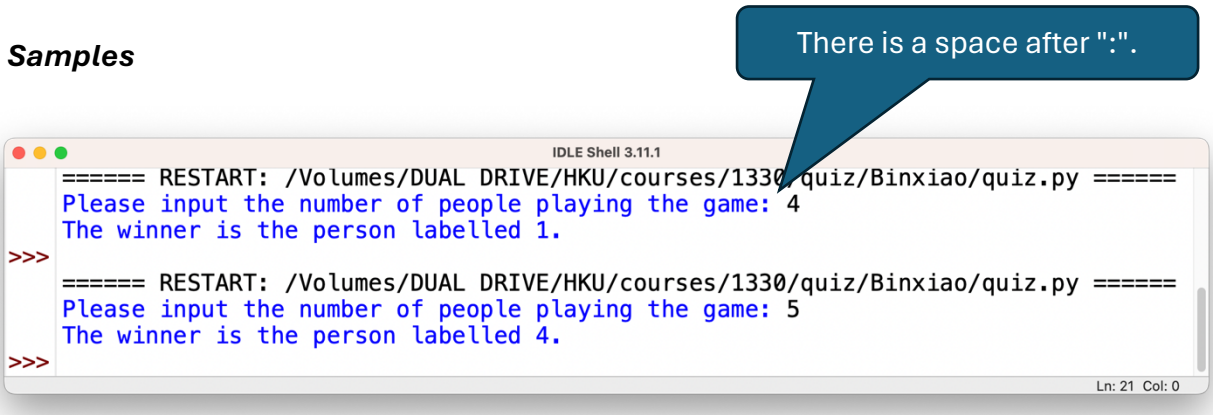
Example

Consider three people playing the game (i.e., N = 3) as follows. The number on the left is the label and the number on the right is the count.

1 → 1
2 → 2
3 → 3 (out)
1 → 1
2 → 2
1 → 3 (out)

The person labelled 2 is the last person left in the game and becomes the winner of this game.

Samples



q_vpl_4. [30 marks]

Write a program to input two words (strings of alphabets in lowercase) and find the ***most*** common character(s) of the two words (i.e., the character(s) with the greatest number of common occurrences in both words). Print a string which starts with the greatest number of common occurrences, followed by the most common character(s) in alphabetical order.

Example

Consider the two words: xaaaabbbccdddy and pddddcccbbbaq
The common characters are a, b, c, and d with number of common occurrences in both words being 1, 3, 2, and 3 respectively. So, the most common characters are b and d with the greatest number of common occurrences of 3. Therefore, the output string is 3bd.

Samples