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 RV UNIVERSITY <i>Go, change the world</i> <small>AN AFFILIATE OF RV EDUCATIONAL INSTITUTIONS</small> School of Computer Science & Engineering B.Tech (H) Program	Internal Assessment 1 Academic Year: 2023 – 2024 Term: 11.09.2023 - 29.12.2023 Semester: I	Set -1
	Date: 02.11.2023 Time: 9:30 AM - 11:00 AM Course Code: CS1000 Course Name: Fundamentals of Programming with C Max Marks: 10	

Instructions to Students:

1. All questions are compulsory and must be answered.
2. Attempt all questions in sequence. Assume missing data, if any, suitably.
3. Electronic devices, including mobile phones, smartwatches etc., are strictly prohibited during the exam. Any violation of this rule will be considered malpractice and reported to the student disciplinary committee.
4. Please adhere to the syntax of the language; failure to do so will result in a deduction of marks.
5. No restroom breaks are permitted during the examination.
6. **Clearly mention your set number in the answer booklet.**

Q1. Create a C program for a basic calculator using if-else construct, allowing users to perform arithmetic operations such as addition, subtraction, multiplication, and division. The program should prompt users to input two numbers and choose an operation through a menu, executing the selected operation and displaying the result.

[3 Marks]

Q2. Write a C Program to print the following numerical pattern. The program should prompt the user to input the desired number of rows and then display the following pattern.

For example, if the user specifies number of rows as 4, the program will showcase the given pattern:

[3 Marks]

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1
3 5
7 9 11
13 15 17

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Q3. A group of students decided to work with any sequence of distinct single digit integers, i.e. {0,1,2,3,4,5,6,7,8,9}. Let the length of the input sequence be **length**. Taking the input sequence as one integer at a time, they applied the following process (assuming each integer input is read in a variable **y**)

[4 Marks]

Step I: If inputting the first integer, then $x = y$.

Step II: If **x** and **y** are single digit integers, then update **x** with a two-digit integer formed using **x** and **y** such that the digit at tens place is greater than that present at one's place.

Step III: If **x** is not a single digit integer and **y** is a single digit integer. Let $x (= a...b)$ is having **n** number of digits such that '**a**' is at the maximum place value and '**b**' holds the one's position.

- Step III.1:** If $|a - y| = 1$ or $|b - y| = 1$, then update x with an n digit integer formed using n out of $n + 1$ digits ($x = a...b$ has n digits, and y) such that the digit at the maximum place value is the greatest and that present at one's place is the smallest among the $n + 1$ digits.
- Step III.2:** Else if $y > a$, then update x with an $n + 1$ digit integer $ya...b$, i.e. y will occupy the position with the maximum place value.
- Step III.3:** Else if $y < b$, then update x with an $n + 1$ digit integer $a...by$, i.e. y will occupy the one's position.
- Step III.4:** Else if $|a - y| > |b - y|$, then update x with an $n + 1$ digit integer $a...bz$, where $z = |b - y|$.
- Step III.5:** Else update x with an $n + 1$ digit integer $za...b$, where $z = |a - y|$.

After each input, print the updated values of x and y . At the end, output digits of x as a space separated sequence.

length = 6 Sample Input I: 4 2 3 6 5 0 Sample Output I: 4 4 42 2 42 3 642 6 642 5 6420 0 6 4 2 0	EXPLANATION I: Contents of x and y will vary in the following manner: Input 4: $y = 4$. First input. $x = y = 4$ (Apply Step I) Input 2: $y = 2$. $x = 4$ and $y = 2$, thus $x = 42$ (Apply Step II) Input 3: $y = 3$. $x = 42$ and $y = 3$, thus $x = 42$ (Apply Step III.1) Input 6: $y = 6$. $x = 42$ and $y = 6$, thus $x = 642$ (Apply Step III.2) Input 5: $y = 5$. $x = 642$ and $y = 5$, thus $x = 642$ (Apply Step III.1) Input 0: $y = 0$. $x = 642$ and $y = 0$, thus $x = 6420$ (Apply Step III.3)
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length = 6 Sample Input II: 5 8 0 3 9 6 Sample Output II: 5 5 85 8 850 0 8503 3 9503 9 69503 6 6 9 5 0 3	EXPLANATION II: Contents of x and y will vary in the following manner: Input 5: $y = 5$. First input. $x = y = 5$ (Apply Step I) Input 8: $y = 8$. $x = 5$ and $y = 8$, thus $x = 85$ (Apply Step II) Input 0: $y = 0$. $x = 85$ and $y = 0$, thus $x = 850$ (Apply Step III.3) Input 3: $y = 3$. $x = 850$ and $y = 3$, thus $x = 8503$ (Apply Step III.4) Input 9: $y = 9$. $x = 8503$ and $y = 9$, thus $x = 9503$ (Apply Step III.1) Input 6: $y = 6$. $x = 9503$ and $y = 6$, thus $x = 39503$ (Apply Step III.5)
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