OBJECTIVES : Arrays & Methods

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Q1. Write a Java program that displays a menu, reads and validates the user's choice, according to the options in the menu. Your program should perform the appropriate operations using a method for each.
Write the following static methods;

- **menu:** that display a menu as follows, reads and validates the user's choice. The method returns the user's choice.

```
            MENU
    ******************************
    A. Add fractional parts of two numbers (maximum 4 decimal digits for each number)
    B. Convert a double number to integer
    C. QUIT
```

- **fracPart:** that gets a double number with maximum 4 decimal digits and returns its fractional part.
- **roundNum:** that gets a double number. If the fractional of the number is greater than or equal to 0.5, method returns **integer** number plus one. Otherwise, it returns the **integer** number.

Example Run:

```
                MENU
*************************************
A. Add fractional parts of two numbers (maximum 4 decimal digits for each number)
B. Convert a double number to integer
C. QUIT
Enter your choice: D
Enter your choice: G
Enter your choice: B
Enter a double number: 6.4629
The number 6.4629 converted to the integer number 6

                MENU
*************************************
A. Add fractional parts of two numbers (maximum 4 decimal digits for each number)
B. Convert a double number to integer
C. QUIT
Enter your choice: B
Enter a double number: 3.756
The number 3.7560 converted to the integer number 4

                MENU
*************************************
A. Add fractional parts of two numbers (maximum 4 decimal digits for each number)
B. Convert a double number to integer
C. QUIT
Enter your choice: A
Enter two double numbers
16.2496
5.1397
0.2496 + 0.1397 = 0.3893

                MENU
*************************************
A. Add fractional parts of two numbers (maximum 4 decimal digits for each number)
B. Convert a double number to integer
C. QUIT
Enter your choice: C
```

Q2. Write a Java program that finds the minimum and maximum values of an array which is filled with 10 numbers the user entered. The program should also calculates the difference of each number to the min and max numbers, then displays the output messages and a table like below on the screen.

Example Run:
```
Enter 10 integer numbers:
9
2
1
8
4
3
7
5
6
10

The array content: 9 2 1 8 4 3 7 5 6 10

Min number: 1 Max number: 10

index number diff. to min diff. to max
----- ------ ------------ ------------
    0     9        8           -1
    1     2        1           -8
    2     1        0           -9
    3     8        7           -2
    4     4        3           -6
    5     3        2           -7
    6     7        6           -3
    7     5        4           -5
    8     6        5           -4
    9    10        9            0
```

Q3. Write a Java program that displays the given menu below and calls the appropriate method for the selected menu item. The array size is 10.

Write the following static methods;
- **menu:** display the menu on the screen, then read, validate and return the user's choice.
  ```
          MENU
  1. Initialize array
  2. Input array elements
  3. Output array elements
  4. Search a value
  5. Exit program
  ```
- **initialize:** sets all integer elements of the array to zero.
- **fillArray:** reads the integer values from the user until zero is entered or the array size is reached. The method must return the number of actual elements inputted as well as the array itself.
- **displayArray:** receives an integer array and the number of actual elements as parameters. Display all array elements on the screen.
- **findPos:** searches for an integer value in the array and returns that position (index) of the first occurrence of the value and returns **-1** if the value is not present.

Example Run:

```
        MENU
1. Initialize array
2. Input array elements
3. Output array elements
4. Search a value
5. Exit program

Enter your choice: 1
All elements are initialized by zero

        MENU
1. Initialize array
2. Input array elements
3. Output array elements
4. Search a value
5. Exit program

Enter your choice: 3
0 0 0 0 0 0 0 0 0 0

        MENU
1. Initialize array
2. Input array elements
3. Output array elements
```

```
4. Search a value
5. Exit program

Enter your choice: 9
Enter your choice: 8
Enter your choice: 2

Enter the elements of the array:
5
10
15
20
25
0
The size of the array: 5


        MENU
1. Initialize array
2. Input array elements
3. Output array elements
4. Search a value
5. Exit program

Enter your choice: 3
5 10 15 20 25

        MENU
1. Initialize array
2. Input array elements
3. Output array elements
4. Search a value
5. Exit program

Enter your choice: 4
Enter the value that will be searched: 15
Position of the value is: 2

        MENU
1. Initialize array
2. Input array elements
3. Output array elements
4. Search a value
5. Exit program

Enter your choice: 4
Enter the value that will be searched: 80
The array does NOT contain the searched number!

        MENU
1. Initialize array
2. Input array elements
3. Output array elements
4. Search a value
5. Exit program

Enter your choice: 5
```

Additional Questions

AQ1. Write a Java program that displays the given menu below and calls the appropriate methods for the selected menu items. First ask user to fill the array with the integer numbers and then ask users' choice from the menu. The integer array must have maximum 100 elements. Depending on the choice, perform the operation mentioned in the menu item selected, write each menu item as a separate method.

Write the following static method;
- **menu:** displays the menu on the screen, then reads, validates and returns the user's choice.

```
DISPLAY
1.  All numbers
2.  Even numbers
3.  Subscripts (indices) of odd numbers
4.  The numbers with even subscripts
5.  Minimum number
6.  Subscript of maximum number
7.  Exit
```

Example Run:
```
Enter the elements of the array: 23 63 87 25 9
25 84 43 73 96 12 45 37 19 54 93 56 7 45 84 23
90 13 3 77 0

DISPLAY
1. All numbers
2. Even numbers
3. Subscripts (indices) of odd numbers
4. The numbers with even subscripts
5. Minimum number
6. Subscript of maximum number
7. Exit

Enter your choice: 9

Enter your choice: -5

Enter your choice: 1

All numbers
************
23 63 87 25 9 25 84 43 73 96 12 45 37 19 54 93
56 7 45 84 23 90 13 3 77

DISPLAY
1. All numbers
2. Even numbers
3. Subscripts (indices) of odd numbers
4. The numbers with even subscripts
5. Minimum number
6. Subscript of maximum number
7. Exit

Enter your choice: 2

Even numbers
************
84 96 12 54 56 84 90

DISPLAY
1. All numbers
2. Even numbers
3. Subscripts (indices) of odd numbers
4. The numbers with even subscripts
5. Minimum number
6. Subscript of maximum number
7. Exit
Enter your choice: 3

Subscripts of odd numbers
*************************
0 1 2 3 4 5 7 8 11 12 13 15 17 18 20 22 23 24
```

```
DISPLAY
1. All numbers
2. Even numbers
3. Subscripts (indices) of odd numbers
4. The numbers with even subscripts
5. Minimum number
6. Subscript of maximum number
7. Exit

Enter your choice: 4

The numbers with even subscripts
********************************
23 87 9 84 73 12 37 54 56 45 23 13 77

DISPLAY
1. All numbers
2. Even numbers
3. Subscripts (indices) of odd numbers
4. The numbers with even subscripts
5. Minimum number
6. Subscript of maximum number
7. Exit

Enter your choice: 5

Minimum number
***************
3

DISPLAY
1. All numbers
2. Even numbers
3. Subscripts (indices) of odd numbers
4. The numbers with even subscripts
5. Minimum number
6. Subscript of maximum number
7. Exit

Enter your choice: 6

Subscript of maximum number
***************************
9

DISPLAY
1. All numbers
2. Even numbers
3. Subscripts (indices) of odd numbers
4. The numbers with even subscripts
5. Minimum number
6. Subscript of maximum number
7. Exit

Enter your choice: 7
```