Problem A. Median [25 points]

Note

For the following problems, write a program to solve the problem and display the answer accurately. A possible output is shown in a example I/O section and responses to input statements appear green. Make sure you run scripts using Python 3.

Problem

The median of an ordered set of measurements is a number separating the lower half from the upper half. If the number of measurements is odd, the median is the middle measurement. If the number of measurements is even, the median is the average of the two middle measurements.

Restrictions

- Use sort method and calculate median each cases.
- Use the format method (not f-string, % operator) to display the following outputs.

Example I/O

```
Enter a number as list : [9, 3, 5, 6]
Median: 5.5
```

Submit format

- HW02_A_(NAME).py

Problem B. Special Number [25 points]

Problem

Write a program to find the four-digit number, call it $abcd$, whose digits are reversed when the number is multiplied by 4. That is, $4 \times abcd = dcba$.

Restrictions

- Use reverse method and join method.
- Use the format method to display the following outputs.

Example I/O

```
Since 4 × 2178 is 8712,
the special number is 8712.
```

Submit format

- HW02_B_(NAME).py

Problem C. Encoding [25 points]

Problem

We want to encode the lists to the encoded lists. The rule is `[number, frequency]`. `number` means the unique numbers in list. `frequency` means how many each unique numbers in the list. and then, we can make the list without order. Each numbers in list are from 0 to 9 as integer.

Restrictions

- Do not use count function.
- Use sort method.
- Use the format method to display the following outputs.

Example I/O

```
Input list = [4, 2, 5, 2, 5, 5, 1, 2, 6, 8, 9]
Encoded list = [[0, 0], [1, 1], [2, 3], [3, 0], [4, 1], [5, 3], [6, 1], [7, 0], [8, 1], [9, 1]]
```

Submit format

- HW02_C_(NAME).py

Problem D. Mortgage Calculations [25 points]

Problem

Write a program to calculate three monthly values associated with a mortgage. The interest paid each month is the monthly rate of interest (annual rate of interest / 12) applied to the balance at the beginning of the month. Each month the reduction of principal equals the monthly payment minus the interest paid. At any time, the balance of the mortgage is the amount still owed—that is, the amount required to pay off the mortgage. The end of month balance is calculated as [beginning of month balance] – [reduction of principal].

Restrictions

- Write the code using the formated code in the below.
- Use the format method to display the following outputs.

Skeleton Code

```
def calculateValues(annualRateOfInterest, monthlyPayment, begBalance):

    # ------- your code -------#
    # ------- your code -------#

    # intForMonth: Interest paid for the month
    # redOfPrincipal: Reduction of principal
    # endBalance: End of month balance

    return (intForMonth, redOfPrincipal, endBalance)
```

Example I/O

```
annual rate of interest: 4
Enter monthly payment: 1720
Enter beg. of month balance: 421940
Interest paid for the month: $1,406.47
Reduction of principal: $313.53
End of month balance: $421,626.47
```

Submit format

- HW02_D_(NAME).py