Sheet 3

Problem 1: *Integer Reversal*

Write a method `intRev` that takes an integer value and returns the number with its digits reversed.
For example, given the number 7631, the method should return 1367.

a) With iteration
b) With recursion

Problem 2: *Random Stars I*

Write a method `rndStars` that takes an integer w and a real number $0 \leqslant p \leqslant 1$ and returns a string representing $w \times w$ square with about $p \cdot w^2$ randomly placed '`*`'. The returned string must contain exactly w lines and every line must contain exactly w characters, either '`*`' or '` `'.
For example, `rndStars(5,0.4)` may return a string like[1]:

```
  * *
  * *
*   *
   *
* * *
```

Problem 3: *Random Stars II*

Write a method `rndStars` that takes a char matrix representing $w \times w$ square and a real number $0 \leqslant p \leqslant 1$. The method must place '`*`' at exactly $p \cdot w^2$ randomly selected places in the matrix and '` `' otherwise.
For example, `rndStars(sky[5][5],0.4)` may update `sky` to be like[2]:

```
  * *
  * *
*   *
   *
* * *
```

Problem 4: *Mean, Median, Mode, and Range*

Write a program to read an array and calculate the mean, median, and trend. Make sure that you use modular programming technique.
Given $X = \{x_i, i \in [1, N]\}, x \in [0, 99]$, then:

$$\mathbf{mean}(X) = \frac{1}{N}\sum_{i=1}^{N} x_i.$$

$$\mathbf{median}(X) = \begin{cases} x_{(N+1)/2} & , N \text{ is odd} \\ (x_{N/2} + x_{N/2+1})/2 & , N \text{ is even} \end{cases}, X \text{ is sorted.}$$

$\mathbf{mode}(X)$ is the most frequent $x \in X$

$\mathbf{range}(X) = \mathbf{max}(X) - \mathbf{min}(X)$

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1 Note that the outline around the returned string is just for clarification.

2 Note that the outline around the returned string is just for clarification.