

CSE 111 Final

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I. QUESTION (15 POINTS)

Write a method named *yardSale* that takes a parameter, an initial amount of money, and returns the amount of money the user ends up with after a series of purchases. Your method should ask the user for a series of potential purchases specified by a unit price per single item and the quantity of that item until the users available amount of money is less than 5 TL. The user buys everything that does not exceed his current amount of money and that is considered a "good deal" (if the unit price is under 10 TL, it is good deal). A message should be printed when such a purchase is made. In addition, your method should print the total quantity of items purchased and the total cost of the most expensive item purchased. A possible output with an initial money of 50.75 TL is as follows:

```
Price? 8.75
Quantity? 2
What a deal! Ill buy it.
Remaining money: $33.25
```

```
Price? 11.50
Quantity? 3
Remaining money: $33.25
```

```
Price? 5.10
Quantity? 5
What a deal! Ill buy it.
Remaining money: $7.75
```

```
Price? 6.95
Quantity? 2
Remaining money: $7.75
```

```
Price? 0.75
Quantity? 8
What a deal! Ill buy it.
Remaining money: $1.75
```

```
Total quantities purchased: 15
Most expensive purchase: $25.5
```

II. QUESTION (15 POINTS)

Write a method named *stitching* that accepts two integer parameters *w* and *h* and that returns a two dimensional array of numbers. Each of the *h* rows will contain *w* integers. The first number on each row is the row number.

```
stitching(6, 2);    stitching(2, 3);
1 2 3 4 5 6        1 2
2 3 4 5 6 7        2 3
                   3 4
```

III. QUESTION (20 POINTS)

Write a method named *evenBeforeOdd* that takes an array of integers as a parameter and rearranges its elements so that all even values appear before all odds. For example, if the following array is passed to your method:

```
5, 2, 4, 9, 3, 6, 2, 1, 11, 1, 10, 4
```

Then after the method has been called, one acceptable ordering of the elements would be:

```
4, 2, 4, 10, 2, 6, 3, 1, 11, 1, 9, 5
```

The exact order of the elements does not matter, so long as all even values appear before all odd values. For example, the following would also be an acceptable ordering:

```
2, 2, 4, 4, 6, 10, 1, 1, 3, 5, 9, 11
```

Hint: Look for elements that are at inappropriate places in the array and move them to better locations.

IV. QUESTION (15 POINTS)

Write a method that takes a matrix as parameter (2 dimensional array) and returns true if the matrix is identity matrix, false otherwise.

V. QUESTION (15 POINTS)

Write a recursive method

```
int S(int N, int k)
```

to calculate Stirling numbers of the first kind where

$$S(n, n) = 1$$

$$S(n, 0) = 0, \text{ if } n \neq 0$$

$$S(n, 0) = 1, \text{ if } n = 0$$

$$S(n, k) = kS(n - 1, k) + S(n - 1, k - 1)$$

VI. QUESTION (20 POINTS)

Write a method that reads *N* integers and returns the number of integers that are two standard deviation above or below the mean of those *N* numbers. Standard deviation of *N* numbers is calculated as:

$$s = \sqrt{\frac{\sum_{i=1}^N (x_i - m)^2}{N - 1}}$$

Your method should use the following methods

- a method to read *N* integers
- a method to find the average of *N* numbers
- a method to find the standard deviation of *N* numbers

which must also be implemented.