CSCE 210 DATA STRUCTURES
PRACTICE EXERCISES 1

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These exercises are meant to help you test and firm up your understanding of recursion. These do not have to be turned in for grading. See me for help if you need to.

1. Write a recursive method

```
int search1(int [] arr, int upper, int X)
```

that searches a portion `arr[0..upper]` of an array `arr` for the occurrence of a value `X`. The method returns the position where `X` is found in `arr[0..upper]`. If `X` is not in the designated part of the array, the method returns -1.

2. Write a recursive method

```
int search2(int [] arr, int lower, int X)
```

that searches a portion `arr[lower..arr.length-1]` of an array `arr` for the occurrence of a value `X`. The method returns the position where `X` is found in `arr[lower..arr.length-1]`. If `X` is not in the designated part of the array, the method returns -1.

3. Write a recursive method

```
int max(int [] arr, int upper)
```

that returns the largest value in a portion `arr[0..upper]` of an array `arr`.

4. Write a recursive method

```
int sum(int n)
```

that returns the sum of the first n positive integer. So for example, `sum(4)` returns $1 + 2 + 3 + 4 = 10$. You may assume $n \geq 0$.

5. Write a recursive method

```
int oddsum(int n)
```

that returns the sum of the first n positive odd integer. So for example, `sum(4)` returns $1 + 3 + 5 + 7 = 16$. You may assume $n \geq 0$.

6. A *palindrome* is a string of characters that reads the same forward as backwards. For example, all of the following are palindromes:

```
a    madam    mom    radar
```

In addition, the empty string is also a palindrome.

Write a recursive method

```
boolean isPalindrome(char [] str,  int lower, int upper)
```

that checks whether the characters in the portion `str[lower..upper]` form a palindrome. The method returns **true** if the that part of the string is a palindrome, and returns **false** otherwise.