Programming Exam Choice 17

Start by downloading the question 17 files from the moodle into a new directory on your machine. You will be changing the code in the question17.cpp file. You have a Makefile to handle building this code.

Part 1. 10 points

You will complete the improved partition function that handles duplicate items in quicksort. Use the first element in the array as the pivot for this assignment. Be sure your code updates pivot_index to the final position of the pivot. I've given you part of the partition code so that you can see the array before and after each partition.

```
void partition(string* arr, unsigned int size, unsigned int& pivot_index)
{

	cout << "partitioning " << endl;
	for (unsigned int i = 0; i < size; ++i)
		cout << *(arr + i) << " ";
	cout << endl;

	string pivot = arr[0];

	// add your code here

	cout << "post partitioning pivot " << pivot_index << endl;
	for (unsigned int i = 0; i < size; ++i)
		cout << *(arr + i) << " ";
	cout << endl;
}
```

Here's the logic we discussed in class for the problem:

```
Let pivot be the first item in the array a, a[0].
Set a counter lt = 0 and set a counter gt = size - 1;
Scan i from left to right, stopping at exactly the right time...
	If (a[i] < pivot), exchange a[lt] with a[i], and increment both lt and i
	Else if (a[i] > pivot), exchange a[gt] with a[i]; decrement gt
	Else if (a[i] == pivot), increment i
```

Test your code and when you are satisfied, please upload your question17.cpp file to the moodle. Your TA may ask you to zip other files in as well.

Logic of problem laid out in comments:	50%
Code compiles with no errors or warnings:	10%
Code has no run time errors:	10%
Code gives correct answers for all inputs:	20%
Code is clean and easy to read:	10%