**Priority Queue**

Last Modified: 11 Feb 2022

This assignment is due to be completed and submitted by noon Friday, 18 February.

[Here](https://borax.truman.edu/310/218/analyze_pq.cpp) is a program that uses [this priority queue class](https://borax.truman.edu/310/218/pq.h). The program inserts a number of values into a priority queue and then removes them. The priority queue treats a larger unsigned integer as a higher priority than a smaller value.

The priority queue object keeps a count of the basic operations performed during its lifetime to date, and that count is available via an accessor. In one or two places I have put statements such as op\_count++;, but these are incomplete. We only count operations involved in inserting and removing elements, not auxiliary operations such as is\_empty() or size()

The class implements a priority queue with an *unsorted* vector. Your assignment is to re-implement the priority queue implementation using a heap built on a vector, exactly as we discussed in class. Leave the framework and public method interfaces completely unchanged. My original test program must work with your new class.

You will have to write new private methods bubble\_up and percolate\_down. You should *not* implement heapify or heapsort.

Write a paper that analyzes your new PQ implementation. Your paper should include a plot of the actual results of exercising your class with many different input sizes and arrangements, together with the standard function or functions that match your analysis. Be sure to label the axes and contents of your plot. You do *not* have to come up with a function for the exact number of operations performed by your class, but you should justify the scaling coefficients you use in your plots.

You must state whether or not your analysis matches what we claimed in class. If it does match, explain how that can be seen in your analysis. If it does not match, explain why not.

Submit your pq.h file, your LaTeX source, and the finished analysis paper to the [homework submission](https://borax.truman.edu/310/submit.php) page.