```
simulation data for 10 trials          PercolationUF
grid    mean    stddev  total time
100     0.593   0.019   0.048
200     0.596   0.006   0.055
400     0.592   0.006   0.163
800     0.592   0.003   0.894
1600    0.594   0.002   4.875
3200    0.593   0.001   20.782


simulation data for 10 trials
grid    mean    stddev  total time      Percolation DFS
100     0.593   0.019   0.054
200     0.596   0.006   0.055
400     0.592   0.006   0.238
800     0.592   0.003   1.198
1600    0.594   0.002   8.458
3200    0.593   0.001   56.155


simulation data for 10 trials          Percolation BFS
grid    mean    stddev  total time
100     0.593   0.019   0.079
200     0.596   0.006   0.059
400     0.592   0.006   0.186
800     0.592   0.003   1.481
1600    0.594   0.002   12.378
3200    0.593   0.001   89.507
```

1. Run time increases by approximately a factor of 4. The sample has clear outliers when n is smaller. The data points to some universal functions taking a set amount of time thus growing the grid size still increases runtime by a consistent factor but it isn't obvious based on the results.

2. This increases runtime by just under a factor of 2. This makes intuitive sense as double the number of trials doesn't effect runtime of the specific algorithm just how many times the same algorithm is run.

3. By graphing the grid size and runtime as (x,y) coordinates, I calculated a trend line. The trend line is a quadratic function to represent the quadratic runtime of the UnionFind interface.

$0.0486 + -5.56E-04n + 2.2E-06n^2 = R(t)$

If R(t) is set to 86400s , n approximately == 198298.

4.

The ethical dilemma stemming from technology's increasing usefulness and society's desire to solve bigger and bigger issues with tech will be one of my generations greatest struggles. I believe the failure ultimately lies in human imperfection. As creators of the technology/algorithms our biases, ignorance, and in the case of redistricting, political views, directly effect the morality of the machines. While we can make machines impartial in simple mathematical computations, when you apply these simple calculations to massive, human problems, the trade-offs aren't so black and white. At our current state of algorithmic processing no solution apart from random probability has absolute equality which within itself creates its own biases. So, while technology should be and instrumental part of these complex tasks, human involvement is important not only for the ethical considerations of decision making but also as a reminder that even in machines there are no ethical absolutes.