John Alexander
8327934
CS 130B
Project 1

Running with the specified configuration, the worst-case brute-force algorithm performs as expected, displaying O(n^2) behavior and consistently taking longer than the other two algorithms. However, in general the basic O(n (log n)^2) algorithm method performs faster than the optimal O(n log n) algorithm, and unexpected result. The cause of this inconsistency is likely that the basic algorithm only sorts points by y-coordinate when they are present within the vertical strip around the division point between recursion sets. Due to the wide x-distribution of the values, very few points will fall within this strip, meaning that the number of points that must be y-sorted during this step is much lower than the worst case "n." On the other hand, the optimal algorithm goes to the trouble of sorting *all* of the points by y-coordinate, something that the basic algorithm does not have to do. If this explanation is true, it demonstrates the practical difference between worst-case complexity and average complexity because, while the worst-case complexity of the basic algorithm is greater than that of the optimal algorithm, its average complexity is likely better.

The experimental data is presented below along with a graph of run time against log (base 10) of the number of points.

n		**Brute**	**Basic**	**Optimal**
10	**1**	0.003	0.004	0.003
100	**2**	0.004	0.004	0.002
1000	**3**	0.04	0.016	0.015
10000	**4**	1.956	0.078	0.134
100000	**5**	191.865	0.754	0.937
1E+06	**6**		8.5	9.451
1E+07	**7**		92.888	104.293