



1. Data2 runtime was very high for the first couple of exponents. With small bases, each number has to be changed to have many more digits than in base 10 representation and then count sort each column of digits. As Data2 has a very large list of numbers, the computer must compute a large amount of digits and then count sort the large size of the input for the large amount of digits for each number in the input which stacks up and leads to a long runtime.

2. Both Data3 and Data4 have a very similar runtime even though Data3 is half the size of data4. This is likely because the main thing increasing the runtime is computations that have to be done that are not as affected by the length of the input list at least for small length of inputs. For example, going through the count and position lists which are dependent on the base rather than the size of the input. Therefore the runtime is not changing much because of the size of the input and are more dependent on other factors like the base
3. All graphs have the trough shape to some degree. This is because at small bases, the amount of count sorts that have to be run increases as the number of digits to represent all the numbers increase. As the bases become bigger, the work required in each count sort increases so the run time increases. This would happen to every radix sort regardless of the input so all inputs were affected by this.
4. Even though the runtime of data2 is a lot higher at the start of data 1, they end up very close to each as the base increases. This is likely because the main thing determining the runtime is the choice of base rather than the size of the input. The amount of work that has to be done due to the choice of base likely dominates the amount of work that has to be done to each number in the input so the runtimes become very similar as the base is the same even though the size of the input is very different
5. Between about exponent 8 to 17 on data 1/data 2 graph, the runtime is about the same but data2 is consistently above data1. As this point, the base seems to be about its optimal value so the work done due to the choice of the base is likely not too unreasonable and bigger proportion of the work is due to the size of input. Therefore as data2 always has a bigger length of input compared to data1, it consistently has a higher run time.
6. The runtime of data1 was not too different to the runtimes of data3 and data4 at the middle exponents. It indicates that either most of the work is due to overhead work the computer has to do to run everything or that the work required to deal with large numbers is somewhat comparable to the work required to deal with large length of input.