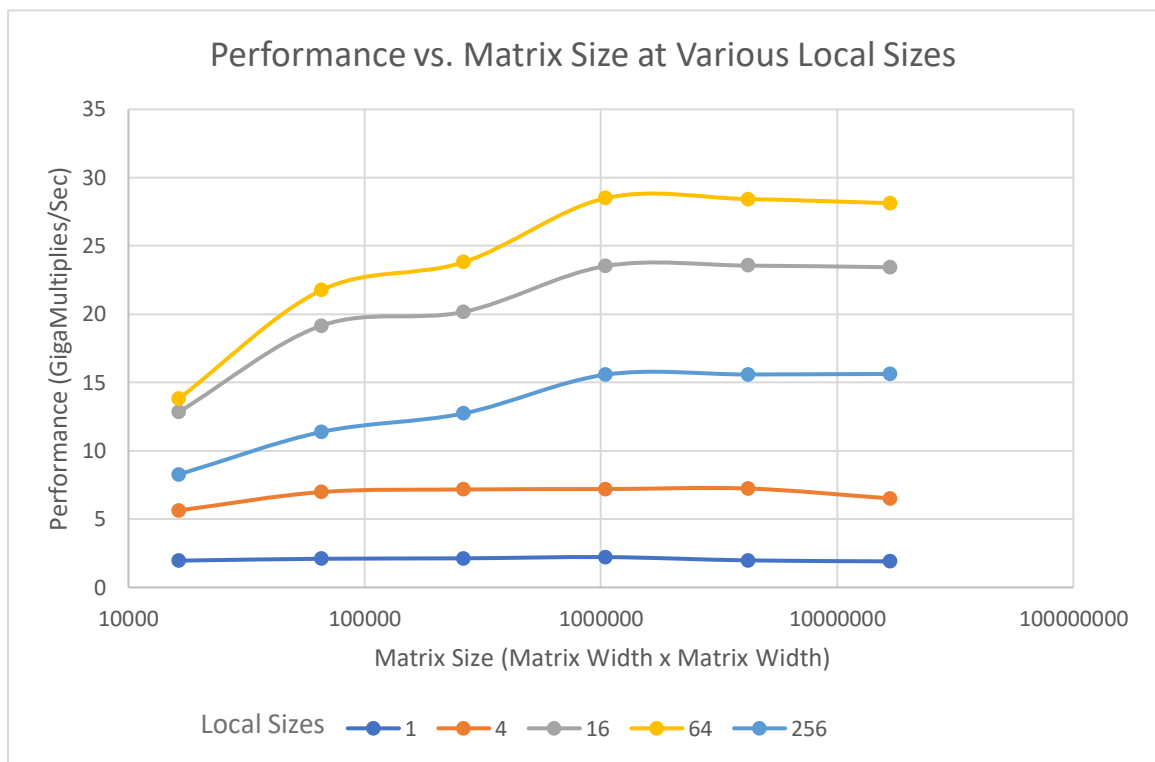
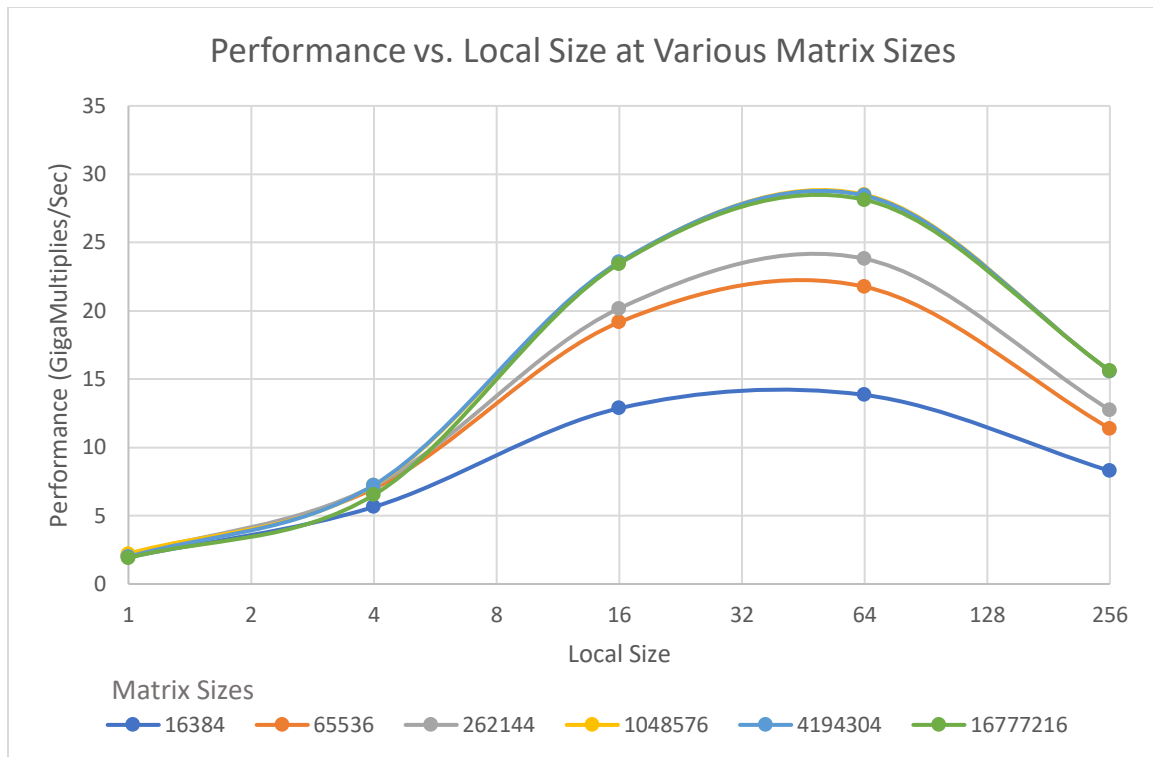


Project 6 Analysis

1. Tell what machine you ran this on. I ran this on rabbit.
2. Show the table and the two graphs:

	Matrix Size (Matrix Width x Matrix Width)					
Local Size	16384	65536	262144	1048576	4194304	16777216
1	1.96	2.1	2.13	2.22	1.98	1.91
4	5.64	6.98	7.17	7.2	7.24	6.52
16	12.86	19.16	20.17	23.53	23.56	23.44
64	13.84	21.76	23.81	28.5	28.43	28.13
256	8.28	11.38	12.74	15.58	15.59	15.63





3. **What patterns are you seeing in the performance curves? What difference does the size of the matrices make? What difference does the size of each work-group make?** Looking at the first graph we can see that as the size of the matrices increases (from 128x128 to 4096x4096), the performance in GigaMultsPerSecond generally increases, except for local sizes smaller than 4 where the performance stays constant. In the second graph, as local size increases and the number of work groups decreases, the performance increases for all matrix sizes until it reaches a local size of 64 where it then decreases in performance. All of the matrix sizes follow the same general curve and matrices 1024x1024, 2048x2048, and 4096x4096 all have a nearly identical performance curve meaning that there must be a cap in performance with matrices with a greater width than 1024 units.
4. **Why do you think the patterns look this way?** Larger matrix sizes generally result in higher performance. As the matrix size increases, there is a larger amount of data available to process, which allows for better utilization of the computational resources and parallelism, since the computer is able to make more computations since there is a greater data set (matrix) to compute. Smaller work-group sizes tend to provide higher performance. This is because smaller work-groups can fit more efficiently into the available compute units, allowing for better workload balancing, reduced memory conflicts, and increased parallelism (up to a certain size). It appears that a work group size resulting in a local size greater than 8x8 will result in decreased performance. I'm assuming this is related to the hardware capabilities and specs. When work-group sizes are smaller, there is less

contention for shared resources, such as memory caches and computation units, resulting in reduced memory conflicts and improved parallel execution.