This is the output from the program data_ham_cycles_MNO.py, which takes the file check_ham_cycles_MNO.csv in as input for different graphs. It stops when it find the first instance of a hamiltonian cycle and prints it out, then creates a chart of the execution time for each graph compared to the number of vertices (the size) of the graph.

Graph 1: Hamiltonian cycle found
Hamiltonian Cycle: ['1', '2', '3', '4', '5', '6', '7', '8', '9', '10', '1']
Execution Time: 0.0000 seconds

Graph 2: Hamiltonian cycle found
Hamiltonian Cycle: ['1', '2', '3', '4', '7', '6', '8', '5', '1']
Execution Time: 0.0001 seconds

Graph 3: Hamiltonian cycle found
Hamiltonian Cycle: ['1', '2', '3', '4', '5', '6', '7', '8', '9', '14', '13', '12', '11', '10', '1']
Execution Time: 0.0001 seconds

Graph 4: Hamiltonian cycle found
Hamiltonian Cycle: ['1', '2', '3', '4', '7', '6', '9', '8', '5', '1']
Execution Time: 0.0001 seconds

Graph 5: Hamiltonian cycle found
Hamiltonian Cycle: ['1', '2', '3', '4', '5', '6', '7', '8', '9', '10', '11', '12', '13', '14', '15', '16', '17', '1']
Execution Time: 0.0001 seconds

Graph 6: Hamiltonian cycle found
Hamiltonian Cycle: ['1', '2', '3', '4', '5', '6', '7', '8', '9', '10', '11', '12', '13', '14', '15', '16', '17', '18', '19', '20', '1']
Execution Time: 0.0002 seconds

Graph 7: Hamiltonian cycle found
Hamiltonian Cycle: ['1', '2', '1']
Execution Time: 0.0000 seconds

Graph 8: No Hamiltonian cycle
Execution Time: 0.0000 seconds

Graph 9: No Hamiltonian cycle
Execution Time: 0.0000 seconds

Graph 10: No Hamiltonian cycle
Execution Time: 0.0001 seconds

Graph 11: No Hamiltonian cycle
Execution Time: 0.0001 seconds

Graph 12: No Hamiltonian cycle
Execution Time: 0.0001 seconds

Graph 13: No Hamiltonian cycle
Execution Time: 0.0001 seconds

Graph 14: No Hamiltonian cycle
Execution Time: 0.0002 seconds

Graph 15: No Hamiltonian cycle
Execution Time: 0.0001 seconds

Graph 16: No Hamiltonian cycle
Execution Time: 0.0001 seconds

Graph 17: No Hamiltonian cycle
Execution Time: 0.0002 seconds

Graph 18: No Hamiltonian cycle
Execution Time: 0.0004 seconds

Graph 19: Hamiltonian cycle found
Hamiltonian Cycle: ['1', '2', '3', '4', '5', '6', '7', '8', '9', '10', '11', '12', '13', '14', '15', '16', '17', '18', '19', '20', '1']

Execution Time: 0.0002 seconds

Hamiltonian Cycle: Size vs Time
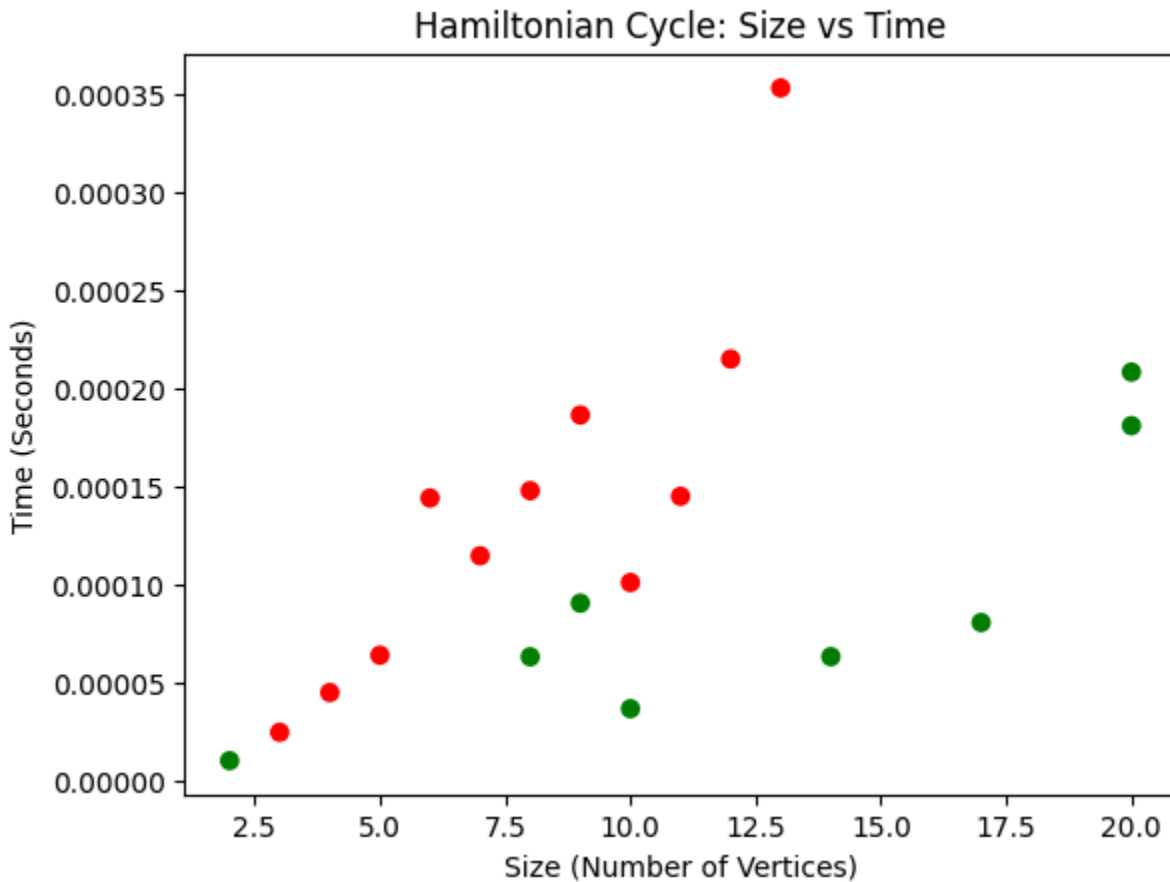
Graphs that had a hamiltonian cycle are represented by green points and graphs that didn't are in red. Both the red and the green data points grow exponentially. As more vertices are added, it takes significantly longer to go through each cycle since there are more to visit. The graphs that don't have a hamiltonian cycle also take much longer because they need to go through each possible cycle, while the ones that have a hamiltonian cycle stop cycling through the graph as soon as it is found.