After you have successfully completed your shortest path code, answer the following questions. For each of 2-5, please be sure to **justify** the running times you claim using what you know about the cost of Dijkstra's algortihm and the meaning of dense and sparse graphs.

1. Briefly describe how you constructed the path list in `returnPath()`. Which end of the list did you append edges to, and why?

2. Suppose we know that our input graph $G = (V, E)$ is dense. What is the asymptotic running time of Dijkstra's algorithm on $G$ in terms of the number of vertices $|V|$?

3. Now suppose we know that our input graph $G = (V, E)$ is sparse. What is the asymptotic running time in terms of $|V|$?

A *Fibonacci heap* is a fancy priority queue data structure. For a heap of size $n$, it takes $\Theta(\log n)$ time to do an *extractMin()* operation but only $O(1)$ time to do an insert or decrease. Suppose we replace the binary heap used in Dijkstra's algorithm by a Fibonacci heap.

4. If the graph is dense, what is the asymptotic complexity of Dijkstra's algorithm using a Fibonacci heap, in terms of $|V|$?

5. If the graph is sparse, what is the asymptotic complexity of Dijkstra's algorithm using a Fibonacci heap, in terms of $|V|$?