Report.pdf

1. Which implementation is better and by how much?
   Our ufind performed at much faster runtime in comparison to BFS. We tested multiple different actor pairs, each search performed 100 times in the pairs file. Our ufind time was
   on average much faster than our BFS, at least 2x at fast.

2. When does the union-find data structure significantly outperform BFS (if at all)?
   Ufind significantly out performs BFS in almost every case for our program. On average and for a nonspecific case, ufind is faster when we have changing relationships that require union at different situations. BFS is faster or as fast as ufind when the edges in the graph are fixed and unchanging.

3. What arguments can you provide to support your observations?
   Using union by rank your ufind should have a worst case runtime of log(n) and can be even faster with path compression. A BFS runtime is O(V+E) and when we are dealing with a dynamically changing graph that runtime piles up.