Problem Set 5 - Shortest Paths

<u>Problem C</u>
This question's approach/algorithm came to me pretty quickly. I think the whole concept of shortest path, what each of the algorithm's do clicked pretty well, and this question really just feels like a test of one's understanding of the Floyd-Warshall algorithm. I also helped that 2E - Ancient Berland Roads had quite a similar approach, in thinking about the question in a reverse order.

This question wants us to get the sum of all the shortest paths at different stages of deletion, where each stage represents a subset of nodes that are still in the graph. I was pretty quick to realise for this question that this is simply just a reversal of the Floyd Warshall algorithm. The Floyd Warshall algorithm slowly adds in new sets of intermediates into the graph, and checks if adding such intermediate affects any of the shortest paths.

What we can do then, is reverse the order of deletions, so that we now have a set of additions into the graph, and then add in each vertex into the graph as we would in Floyd Warshall, testing if it, acting as an intermediary, changes any of the shortest paths. From this, we can then - at every new intermediary added, sum up the edges between edges current in the graph, and then add that sum to a list.

Reverse the list at the end, and we have our answer :)

One of the quicker questions!