# Module 9 - Network Flow and Ford-Fulkerson

1. Take the following flow-network and run the Ford-Fulkerson algorithm on it. Once you are done, write the following items in your response:

   - Write the original / starting residual graph G_f for this network BEFORE execution of Ford-Fulkerson begins. This should be an *Adjacency Matrix*

   - Write out the final / ending residual graph G_f after Ford-Fulkerson completes. This should be an *Adjacency Matrix* and make sure to include *backflow edges*.

   - What is the final maximum flow f for this Graph?
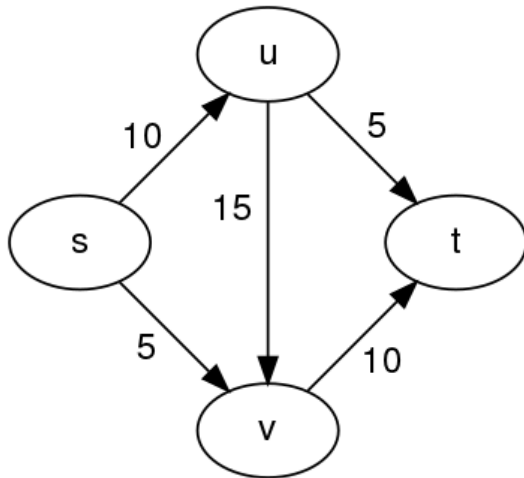
2. Consider the flow network you see below (the bolded edges the first augmenting path that Ford-Fulkerson will discover). What is the **maximum** number of iterations that Ford-Fulkerson could make (i.e., what is the most number of times DFS could run). Explain how this maximum could be reached and why it is a major issue.
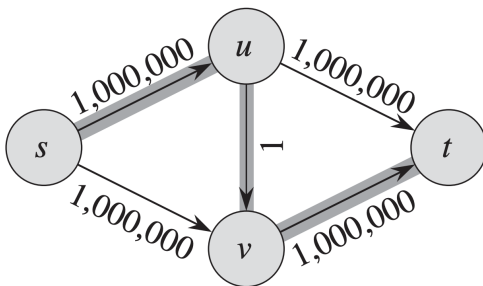
3. Suppose we want to take a *flow-network* as input, and return a set of at most $|E|$ augmenting paths that produce the maximum flow on that network. Describe an algorithm to do this. *Hint: Find the maximum flow using any number of augmenting paths first, then try to reverse engineer how to reach that flow with at most $|E|$ augmenting paths.*