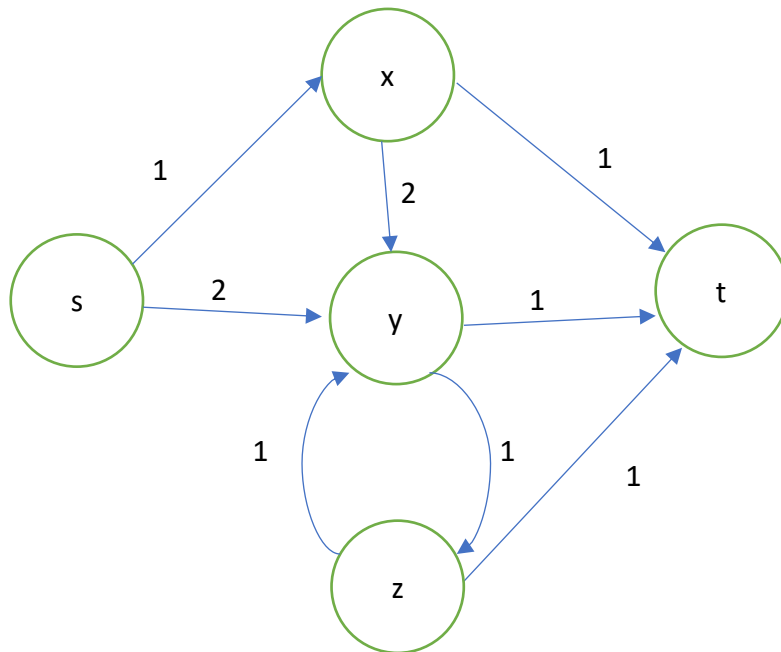
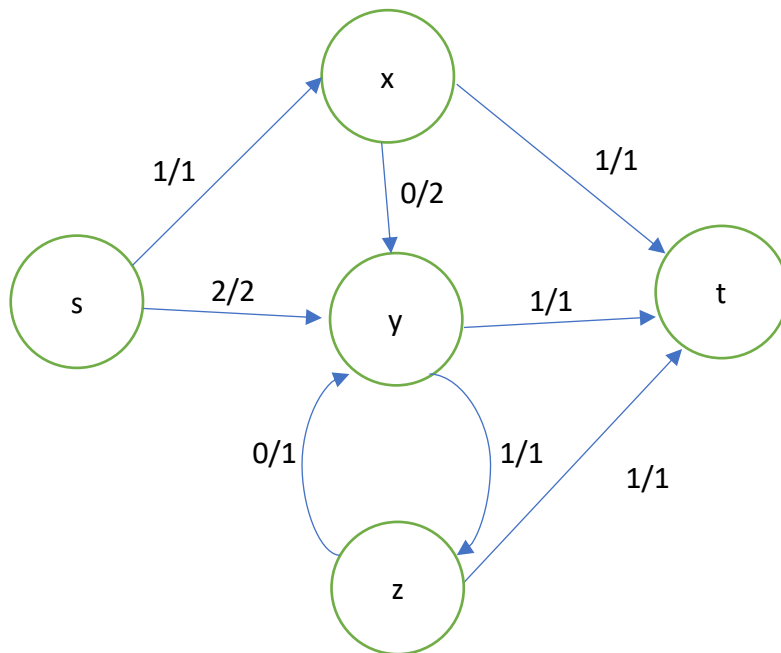


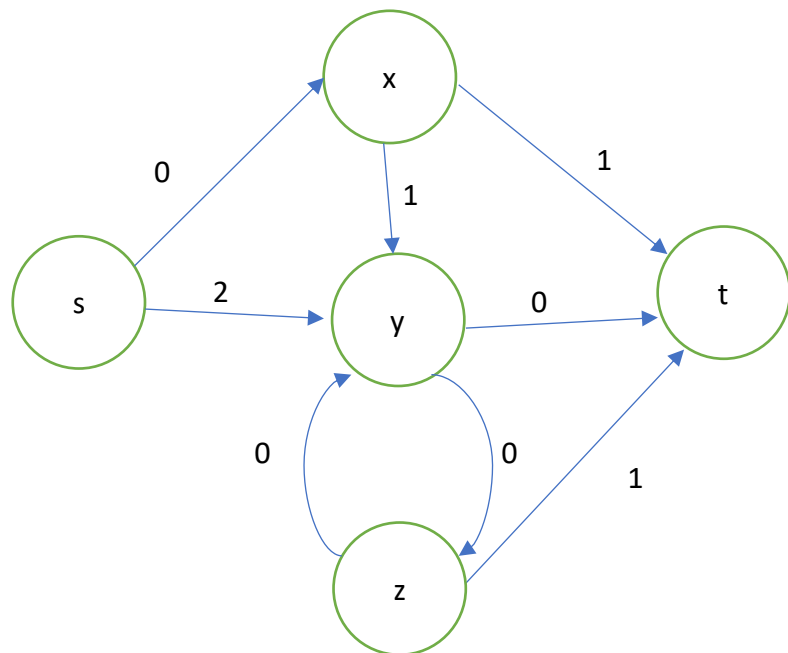
No, that implementation doesn't return at least  $\frac{1}{2}$  of the maximum flow.  
See counterexample:



Those numbers are the edge capacities. The maximum flow would be 3, with the flow like this:



If we were to run my friends' faulty Ford-Fulkerson algorithm, though, the flow might end up as 1, which is less than half of 3. First of all, the path from  $s$  to  $t$  of maximum value is 1, for which several paths have ties:  $[s, x, t]$ ,  $[s, x, y, t]$ ,  $[s, x, y, z, t]$ ,  $[s, x, y, z, y, t]$ ,  $[s, y, t]$ ,  $[s, y, z, t]$ , and  $[s, y, z, y, t]$ . The algorithm could pick  $[s, x, y, z, y, t]$ ; so the faulty residual graph would be:



No more paths from  $s$  to  $t$  exist now.