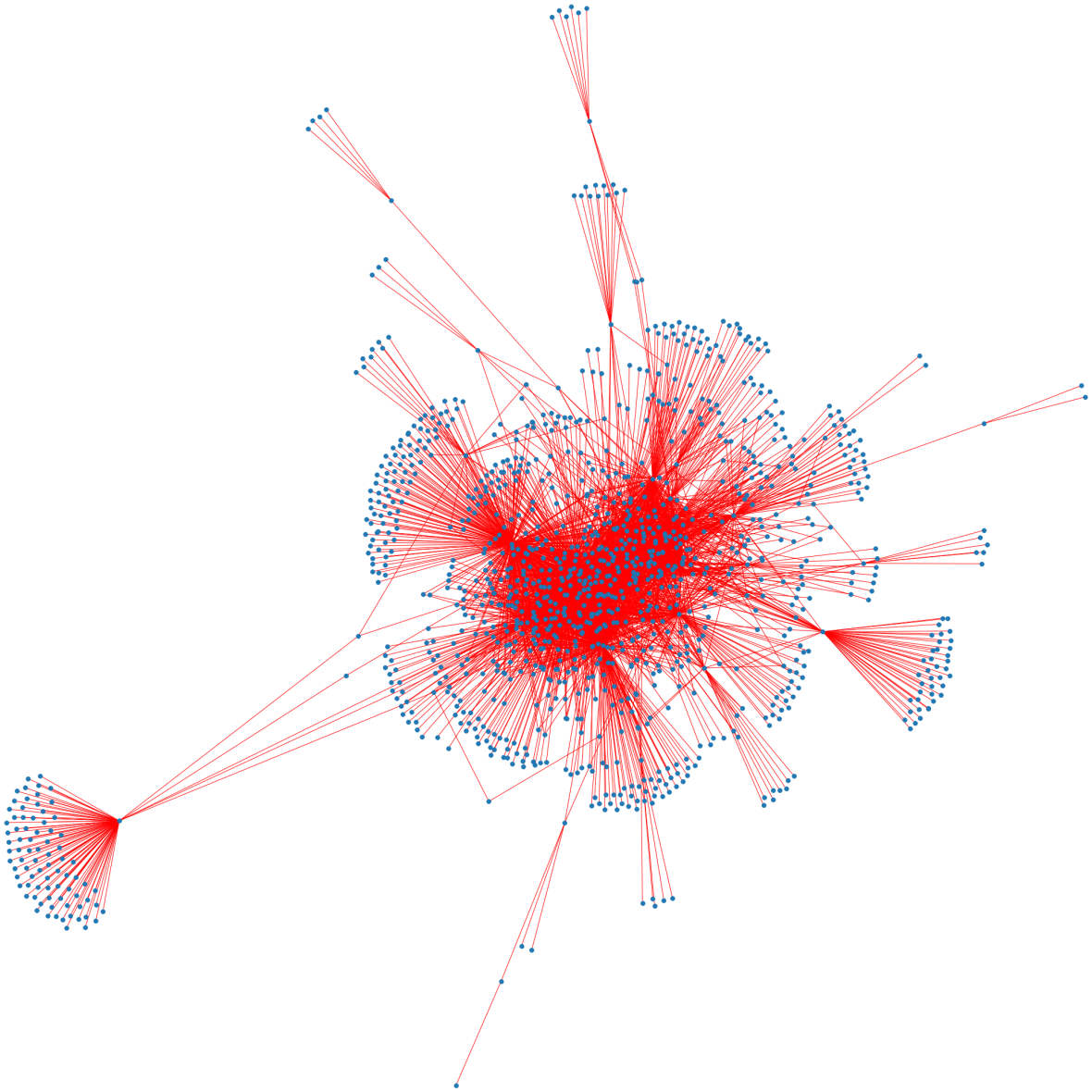
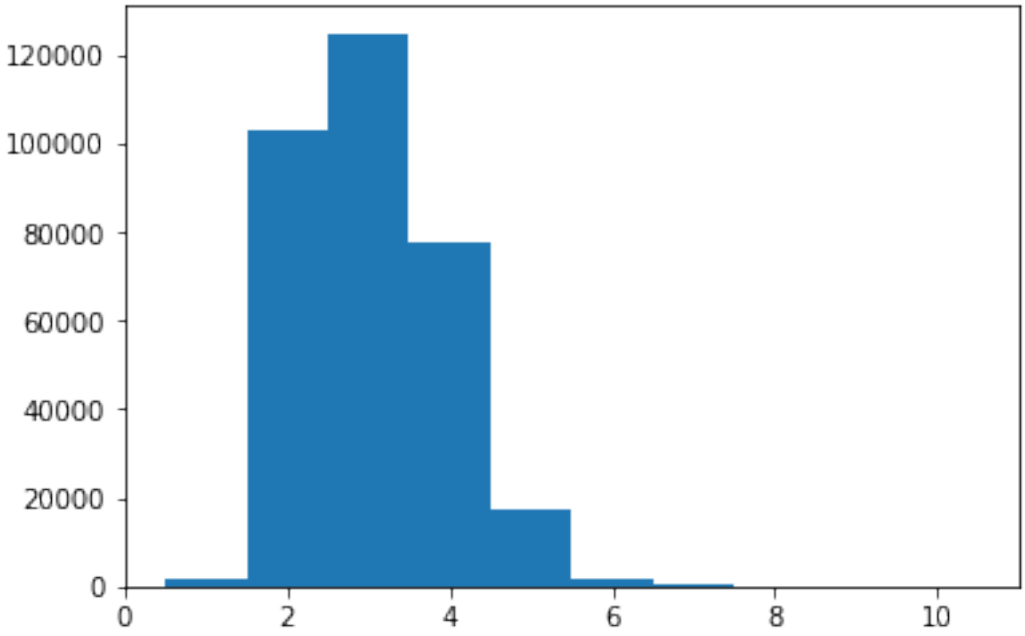
Comp150 Network Science HW5

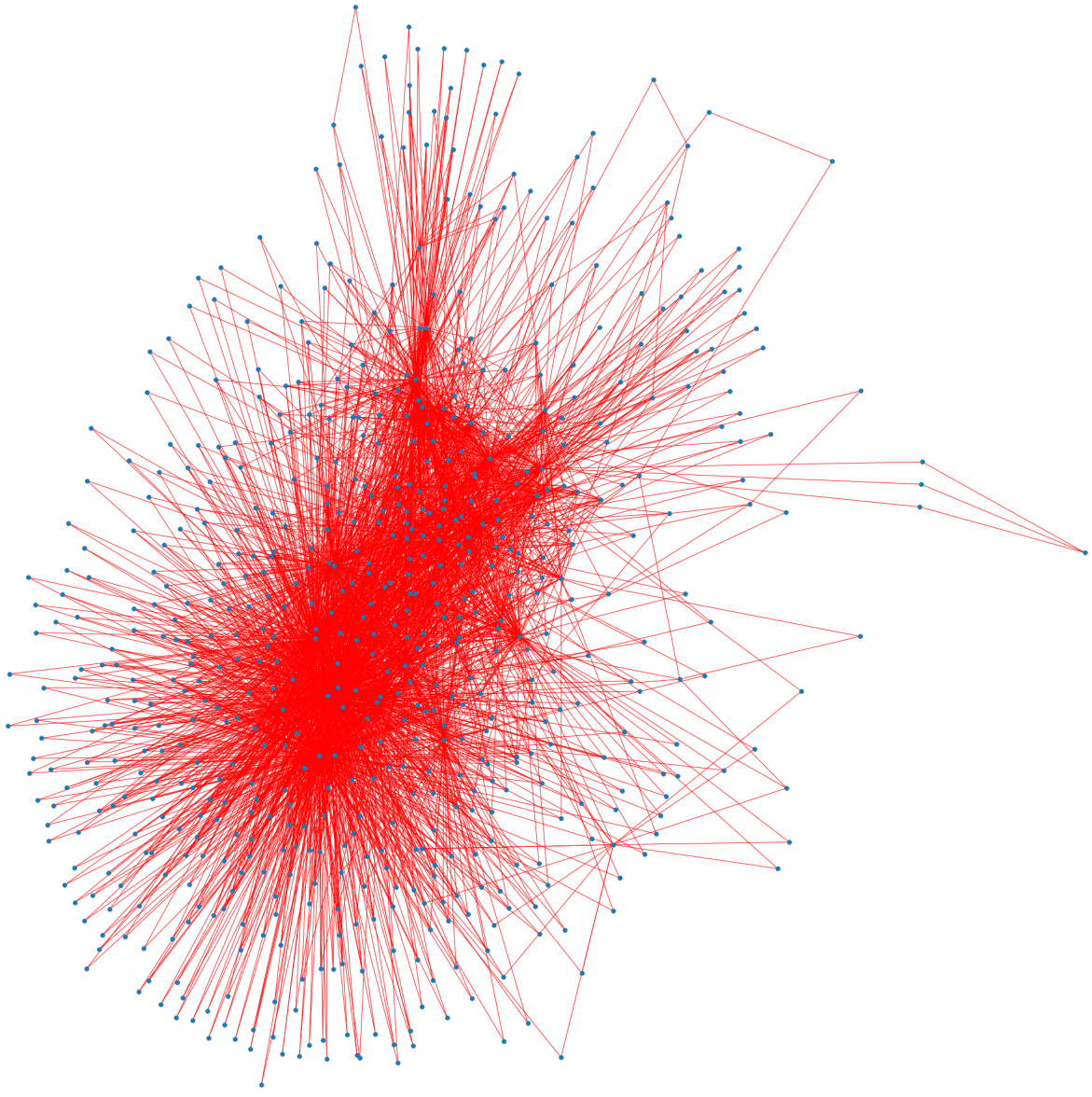
Part I
1.





My estimate of average shortest path length is 3
My estimate of diameter is 7.

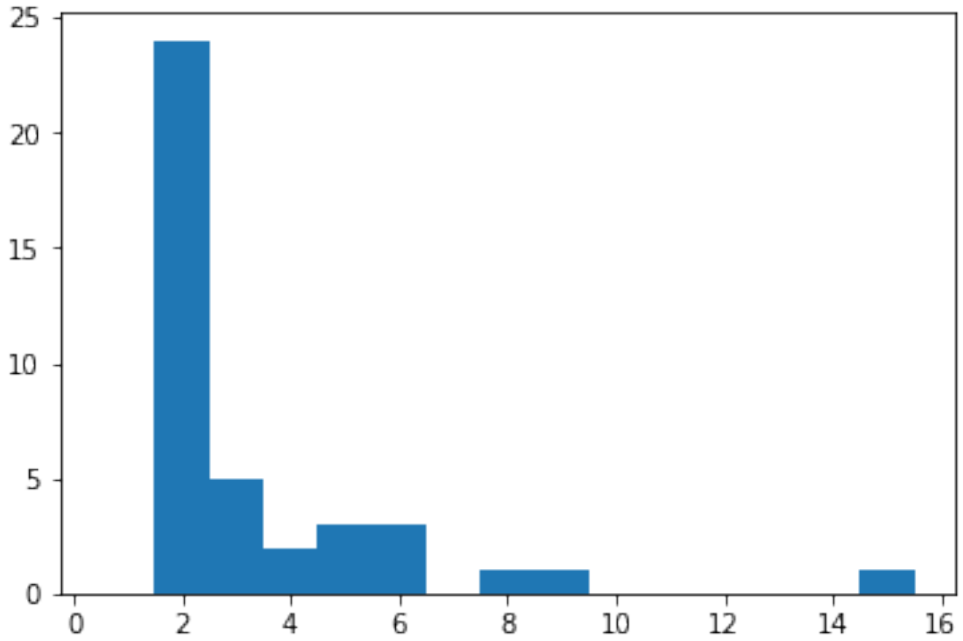
2.



The 2-core has diameter equals to 5 and average shortest path length equals to 2.3062.

3. Here I listed the result of 2 iterations.
5 % nodes removal: 2 connected components, average shortest path length is 2.3067415551221897 , diameter is 5
10 % nodes removal: 3 connected components, average shortest path length is 2.3408899341597262 , diameter is 5
15 % nodes removal: 2 connected components, average shortest path length is 2.3223191036060915 , diameter is 6
5 % edges removal: 1 connected components, average shortest path length is 2.345743747777646 , diameter is 6
10 % edges removal: 3 connected components, average shortest path length is 2.380206842597363 , diameter is 7
15 % edges removal: 1 connected components, average shortest path length is 2.415190233495318 , diameter is 5
5 % nodes removal: 1 connected components, average shortest path length is 2.3072125799226866 , diameter is 5
10 % nodes removal: 1 connected components, average shortest path length is 2.293501931858096 , diameter is 5
15 % nodes removal: 7 connected components, average shortest path length is 2.336942097280901 , diameter is 5
5 % edges removal: 3 connected components, average shortest path length is 2.335484763485794 , diameter is 6
10 % edges removal: 3 connected components, average shortest path length is 2.375770412349495 , diameter is 6
15 % edges removal: 7 connected components, average shortest path length is 2.416926673299653 , diameter is 6

4.



{('13237', '8190'), ('3303', '8190'), ('3491', '8190'), ('4589', '8190')} must be removed to disconnect 6140 and 8190.

Part II

If the capacities are specified not on the edges but on the vertices, then we can split each vertex v into 2 vertices v1 and v2 connecting by an edge with the capacity equal to the capacity if vertex v. And then connecting every edges that are connected with v to v1 and v2. Finally remove v from our graph. Then we can apply the the ordinary network flow theory to our graph