

Name: _____

HW9 Worksheet

PLEASE ANSWER THESE QUESTIONS ON A SEPARATE SHEET OF PAPER TO BE TURNED IN.

For the following problems, you will simulate the independent cascade model. To ensure everyone gets the same answers, I have pre-generated the random numbers that you will use, and placed them in the table below. Here's how it works. For each part, there will be a set S of nodes that begin as infected. For each infected node, there is a chance that the infection will spread along their outward edges. For example, consider the edge $(1,2)$, which has probability 0.2. Assuming node 1 is infected, to determine if the infection spreads from 1 to 2, we refer to the random number generated in the table. For part (a), this number is 0.901. The infection spreads if **the random number is less than or equal to the edge's probability**. Justify to yourself why it's this way and not the other way around. Remember, each edge only has at most one chance to spread the infection. For each part (a) through (d), you are given the set of initial infected nodes S , and your task is to write down the final set of infected nodes. Remember, nodes never become uninfected once they are infected.

- a) $S = \{1,5,13\}$
- b) $S = \{4,7,15\}$
- c) $S = \{7,8,13\}$
- d) $S = \{2,4,14\}$

Edge	Random Numbers			
	(a)	(b)	(c)	(d)
1→2	0.901	0.827	0.115	0.786
1→3	0.258	0.565	0.871	0.286
2→5	0.378	0.338	0.888	0.521
2→7	0.994	0.141	0.797	0.188
3→4	0.842	0.594	0.732	0.359
3→14	0.776	0.805	0.123	0.992
4→11	0.541	0.160	0.622	0.548
4→14	0.381	0.492	0.578	0.135
5→3	0.311	0.547	0.408	0.995
5→4	0.697	0.434	0.664	0.356
5→10	0.484	0.512	0.652	0.103
5→11	0.764	0.135	0.124	0.719
6→5	0.985	0.652	0.248	0.537
7→6	0.918	0.327	0.968	0.835
8→6	0.975	0.715	0.568	0.452
8→7	0.717	0.692	0.884	0.111
9→8	0.431	0.114	0.788	0.436
10→6	0.567	0.725	0.443	0.508
10→11	0.937	0.198	0.766	0.689
12→9	0.215	0.681	0.973	0.543
12→10	0.137	0.123	0.897	0.886
12→13	0.955	0.483	0.985	0.832
13→10	0.631	0.714	0.526	0.734
13→11	0.706	0.377	0.765	0.328
14→1	0.622	0.687	0.369	0.581
14→15	0.485	0.314	0.143	0.731
15→11	0.389	0.636	0.624	0.677

