3.1.1

A = {1,2,3,4}
B = {2,3,5,7}
C = {2, 4, 6}

SIM(A,B) = $\frac{2}{6} = \frac{1}{3}$
SIM(B,C) = $\frac{1}{6}$
SIM(C,A) = $\frac{2}{5}$

3.13

$$SIM(S,T) = \frac{|S \cap T|}{|S \cup T|} = \frac{k}{2m-k}$$

suppose $|S \cap T| = k$, where $0 \leq k \leq m$. S then has $\binom{n}{m}$ choices and T has $\binom{m}{k}\binom{n-m}{m-k}$ choices.

Therefore $P\left(SIM(S,T) = \frac{k}{2m-k}\right) = \frac{\binom{m}{k}\binom{n-m}{m-k}}{\binom{n}{m}}$

And $E\big(SIM(S,T)\big) = \sum_{k=0}^{m} \frac{\binom{m}{k}\binom{n-m}{m-k}}{\binom{n}{m}} \frac{k}{2m-k}$

10.4.1

Adjacency matrix

	A	B	C	D	E	F	G	H	I
A	0	1	1	0	0	0	0	0	0
B	1	0	1	0	0	0	0	1	0
C	1	1	0	1	0	0	0	0	0
D	0	0	1	0	1	1	0	0	0
E	0	0	0	1	0	1	1	0	0
F	0	0	0	1	1	0	0	0	0
G	0	0	0	0	1	0	0	1	1
H	0	1	0	0	0	0	1	0	1
I	0	0	0	0	0	0	1	1	0

Degree matrix

	A	B	C	D	E	F	G	H	I
A	2	0	0	0	0	0	0	0	0
B	0	3	0	0	0	0	0	0	0
C	0	0	3	0	0	0	0	0	0
D	0	0	0	3	0	0	0	0	0
E	0	0	0	0	3	0	0	0	0
F	0	0	0	0	0	2	0	0	0
G	0	0	0	0	0	0	3	0	0
H	0	0	0	0	0	0	0	3	0
I	0	0	0	0	0	0	0	0	2

Laplacian matrix

	A	B	C	D	E	F	G	H	I
A	2	-1	-1	0	0	0	0	0	0
B	-1	3	-1	0	0	0	0	-1	0
C	-1	-1	3	-1	0	0	0	0	0
D	0	0	-1	3	-1	-1	0	0	0
E	0	0	0	-1	3	-1	-1	0	0
F	0	0	0	-1	-1	2	0	0	0
G	0	0	0	0	-1	0	3	-1	-1
H	0	-1	0	0	0	0	-1	3	-1
I	0	0	0	0	0	0	-1	-1	2