Problem1

(a)the way of water flow; empirical technique: natural study

(b)air cycle; empirical technique: natural study

(c)family tree; empirical technique: data collected by government

(d)circuit diagram; empirical technique

(e)Quadratic equation (x, y)

(f)virus' spreading; empirical technique: random experiment

Problem2

(a)adjacency matrix

A	1	2	3	4	5
1	0	0	0	0	1
2	1	0	1	1	0
3	0	0	0	0	0
4	0	1	1	0	1
5	0	0	0	1	0

(b)adjacency list

A	
1	$\rightarrow\{(5,1)\}$

2	$\rightarrow\{(1,1),(3,1),(4,1)\}$
3	$\rightarrow\{\ \phi\ \}$
4	$\rightarrow\{(2,1),(3,1),(5,1)\}$
5	$\rightarrow\{(4,1)\}$

(c)adjacency matrix

CIRCLE	**1**	**2**	**3**	**4**	**5**	**6**
1	0	1	1	1	0	0
2	1	0	0	0	0	0
3	1	0	0	1	1	1
4	1	0	1	0	0	0
5	0	0	1	0	0	2
6	0	0	1	0	2	0

SQUARE	**1**	**2**	**3**	**4**	**5**
1	0	1	1	0	0
2	1	0	1	0	0
3	1	1	0	1	0

4	0	0	1	0	2
5	0	0	0	2	0

(d)

$2/\sqrt{(4*5)}=1/\sqrt{5}$