Mark Randles
2008-12-09
Homework #5

1.

Bellman-Ford without edge weight change.

Step 1

	d=	pi=
s	0	
t	INF	
x	INF	
y	INF	
z	INF	

Step 2

	d=	pi=
s	0	
t	6	s
x	INF	
y	7	s
z	INF	

Step 3

	d=	pi=
s	0	
t	6	s
x	4	y
y	7	s
z	2	t

Step 4

	d=	pi=
s	0	
t	2	x
x	4	y
y	7	s
z	2	t

Step 4

	d=	pi=
s	0	
t	2	x
x	4	y
y	7	s
z	-2	t

Bellman-Ford with edge (z,x) change to weight 4. Negative cycle detected.

Step 1

	d=	pi=
s	0	
t	INF	
x	INF	
y	INF	
z	INF	

Step 2

	d=	pi=
s	0	
t	6	s
x	INF	
y	7	s
z	INF	

Step 3

	d=	pi=
s	0	
t	6	s
x	4	y
y	7	s
z	2	t

Step 4

	d=	pi=
s	0	
t	2	x
x	4	y
y	7	s
z	2	t

Step 4

	d=	pi=
s	0	
t	2	x
x	4	y
y	7	s
z	-2	t

Neg Cycle De

	d=	pi=
s	0	
t	2	x
x	2	z
y	7	s
z	-2	t

2.

Dijkstra's shortest path using *s* as the source.

Step 1

	d=	pi=
s	0	
t	INF	
x	INF	
y	INF	
z	INF	

Step 2

	d=	pi=
s	0	
t	3	s
x	INF	
y	5	s
z	INF	

Step 3

	d=	pi=
s	0	
t	3	s
x	9	t
y	5	s
z	INF	

Step 4

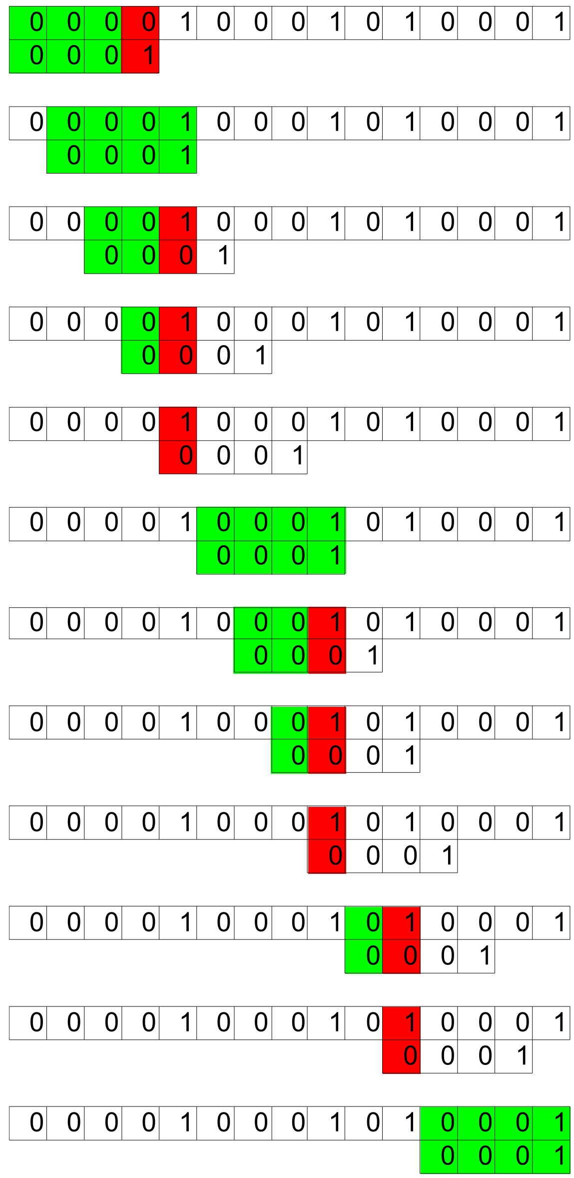
	d=	pi=
s	0	
t	3	s
x	9	t
y	5	s
z	11	z

Dijkstra's shortest path using *z* as the source.

	d=	pi=
s	INF	
t	INF	
x	INF	
y	INF	
z	0	

	d=	pi=
s	INF	
t	INF	
x	7	z
y	INF	
z	0	

3.



4. The following table contains the computed prefix function for the string

P	pi=	
a	1	0
b	2	0
a	3	1
b	4	2
b	5	0
a	6	1
b	7	2
b	8	0
a	9	1
b	10	2
b	11	0
a	12	1
b	13	2
a	14	3
b	15	4
b	16	5
a	17	6
b	18	7
b	19	8

5.
Polynomial: Euler tour, 2-CNF satisfiability
NP: graph isomorphism, string matching
NP-complete: Hamiltonian circuit, 3-CNF satisfiability

6. The Hamilton circuit problem for unidirected graphs is reducable to the Hamilton circuit problem for directed graphs because every unidirected graph can be reduced to a directed graph by changing every edge in the unidirected graph into two edges in the opposite direction but the same weight in the directed graph. The two graphs are equivalent with the directed graph having twice as many edges as the unidirected graph.