

Ex. 2

a)

$\{1\} : 4$	$\{1,2\} : 2$	$\{2,3\} : 3$	$\{3,4\} : 4$
$\{2\} : 6$	$\{1,3\} : 3$	$\{2,4\} : 4$	$\{3,5\} : 4$
$\{3\} : 8$	$\{1,4\} : 2$	$\{2,5\} : 2$	$\{3,6\} : 2$
$\{4\} : 8$	$\{1,5\} : 1$	$\{2,6\} : 1$	
$\{5\} : 6$	$\{1,6\} : 0$		
$\{6\} : 4$			

$$\{4,5\} : 3 \quad \{5,6\} : 2$$
$$\{4,6\} : 3$$

b)

$\{1,2\} \rightarrow 2$	$\{2,3\} \rightarrow 6$	$\{3,4\} \rightarrow 1$
$\{1,3\} \rightarrow 3$	$\{2,4\} \rightarrow 8$	$\{3,5\} \rightarrow 4$
$\{1,4\} \rightarrow 4$	$\{2,5\} \rightarrow 10$	$\{3,6\} \rightarrow 7$
$\{1,5\} \rightarrow 5$	$\{2,6\} \rightarrow 1$	
$\{1,6\} \rightarrow 6$		

$$\{4,5\} \rightarrow 9 \quad \{5,6\} \rightarrow 8$$
$$\{4,6\} \rightarrow 2$$

c)

0 : 0	9 : 3
1 : 5	10 : 2
<hr/>	
2 : 5	
<hr/>	
3 : 3	
4 : 6	
<hr/>	
5 : 1	
6 : 3	
7 : 2	
8 : 6	
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\Rightarrow buckets 1, 2, 4, 8 are frequent

d/ $\{1,2\}, \{1,4\}, \{2,4\}, \{2,6\}, \{3,4\}, \{3,5\}$
 $\{4,6\}, \{5,6\}$

Ex. 3

Second hash function : $(i+j) \% 9$

$\{1,2\} \rightarrow 3$ $\{3,4\} \rightarrow 7$

$\{1,4\} \rightarrow 5$ $\{3,5\} \rightarrow 8$

$\{2,4\} \rightarrow 6$ $\{4,6\} \rightarrow 1$

$\{2,6\} \rightarrow 8$ $\{5,6\} \rightarrow 2$

\Rightarrow

0 :	0	6 :	4
1 :	3	7 :	4
2 :	2	8 :	5
3 :	2	9 :	0
4 :	0		
5 :	2		

\Rightarrow buckets 6, 7, 8 are frequent

That means that only the pairs
 $\{2,4\}, \{3,4\}, \{3,5\}, \{2,6\}$
 remain for the third pass.

\Rightarrow second pass thus reduced the
 set of candidate pairs.

Ex. 4

1st hash function: $(2i + 3j + 4) \% 5$

2nd hash function: $(i + 4j) \% 5$

$\{1, 2\} \rightarrow 2, 5$ $\{2, 3\} \rightarrow 2, 5$ $\{3, 5\} \rightarrow 2, 5$ $\{5, 5\} \rightarrow 2, 5$

$\{1, 3\} \rightarrow 0, 3$ $\{2, 5\} \rightarrow 0, 3$ $\{3, 5\} \rightarrow 0, 3$ $\{4, 6\} \rightarrow 0, 3$

$\{4, 5\} \rightarrow 3, 2$ $\{2, 5\} \rightarrow 3, 2$ $\{3, 6\} \rightarrow 3, 2$

$\{1, 5\} \rightarrow \overset{51}{1}, 1$ $\{2, 6\} \rightarrow 1, 1$

$\{1, 6\} \rightarrow 4, 0$

↖ result of 1st hash
~~first~~ and ~~the~~ second hash
separated by comma

$\{5, 6\} \rightarrow 2, 4$

=>

0 : 14	0 : 0
1 : 2	1 : 2
2 : 14	2 : 6
3 : 6	3 : 14
4 : 0	4 : 14

$S = 7$ would give us ~~6~~ ^{one less than} eliminated pairs which is ~~the~~ the number of eliminated pairs in the PCY alg. in exercise 2. We would need to go up to $S = 15$ to eliminate more pairs since the ~~max~~ bucket count of bucket 0, 2 (1st hash) and 3, 4 (second hash) are 14. That would leave us with no frequent buckets thus no frequent pairs which is a false result.