

40210



40210



90210

Person	Name	Zip	P	N	Z
	Alice	40210		A	90210
	Bob	10003		B	10003
	Carol	14260		C	14260

↓

$Q(cA?)$

↓

\emptyset

↓

$Q(CA?)$

↓

$\{A\}$

$$Q(\vec{D}) \rightarrow \{Q(d) \mid d \in \vec{D}\}$$

Person	Name	Lives in CA
	Alice	50%
	Bob	10%
	Carol	10%

SELECT ~~sum~~ COUNT(*)
 FROM Person
 WHERE Name = Alice OR Name = Carol

↙
 Z

Lives in CA	Name			
	A	0.5	70.5	{ } 0 a
	B	0.1	70.9	{ A } 1 b
	C	0.1	70.9	{ AB } 1 c
				{ ABC } 2 d
				{ B } 0 e
				{ BC } 1 f
				{ C } 1 g

$$Q_1: \text{~~the~~ } \int \pi_B$$

$$Q_2: \int \pi_B \sigma_{A=2}$$

$Q_3:$

		A	
0.5	B	0.05	0.45
0.1		0.05	0.45

$$0.9 \cdot 0.9 \cdot 0.5 = 0.405 \quad a$$

$$0.9 \cdot 0.9 \cdot 0.5 = 0.405 \quad b$$

$$0.9 \cdot 0.1 \cdot 0.5 = 0.45 \quad c$$

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$$P \left[\begin{array}{l} \text{sum} = 0 \\ \text{= 1} \end{array} \right] = a + e = b + c + f + g$$

$$\delta \Pi_B \Rightarrow \delta' \Pi_B \text{ local cond}$$

R	B	φ
1		X=1
1		X=2
1		Y=1
2		Y=2
3		T
1		X=3/Y=1

Q(R)	B	T
	1	X=1 \vee X=2 \vee Y=1 \vee Y=2
	2	Y=2
	3	T

Y=1
↙

Q(R) ₁	B
	1
	3

Y=2
↙

Q(R) ₂	B
	1
	2
	3

$$\delta \Pi_B \sigma_{A=2}$$

σR	A	B	φ
	2	1	X=2

Q(R)	B
	1
	X=2

↙ ↘

R \bowtie R.B=S.A S

R_1	A	B
	4	1
	1	1
	3	3

R_2	A	B
	4	1
	1	2
	3	3

R_3	A	B
	4	1
	1	1
	3	3

R_4	A	B
	4	1
	1	2
	3	3

$$P(R=R_1) = 0.05$$

$$P(R=R_2) = 0.45$$

$$P(R=R_3) = 0.05$$

$$P(R=R_4) = 0.45$$

$$\delta \Pi_B(R) = \{1, 3\} \quad \{1, 2, 3\} \quad \{1, 3\} \quad \{1, 2, 3\}$$

$$\left[\{1, 3\} \rightarrow 0.1 \right]$$

$$\left[\{1, 2, 3\} \rightarrow 0.9 \right]$$

R_5	A	B
	3	1
	1	1
	3	3

R_1	B
	1
	3

R_2	B
	1
	2
	3

↓ ✓

R	B
	1 T
	2 Y=2
	3 T

$Y \in \{4, 2, 3\}$

R	A	B
	1,2	1
	1	1,2
	3	3



R	A	B
	X	1
	1	Y
	3	3

$x \in \{1, 2, 3\}$
 $y \in \{1, 2, 3\}$

$$f^{-1}(k) = \{1, 2, 3\} \cup \{1, 2, 3\} \cup \{1, 2, 3\}$$

R	A	B
	3	3
	1	1
	3	3

R	A	B
	1	1
	2	2
	3	3

R	A	B
	1	1
	2	2
	3	3

$$\begin{aligned}
 b(x=y^1) &= 0.12 \\
 b(x=y^2) &= 0.02 \\
 b(x=y^3) &= 0.42 \\
 b(x=y^4) &= 0.02
 \end{aligned}$$

$x \in \{1, 2, 3\}$
 $y \in \{1, 2, 3\}$

$(x=3) \rightarrow (y=1)$
 global condition

$x=3, y=2$

R	A	B	
1	1	1	$x=1$
2	1	2	$x=2$
3	1	3	$y=1$
1	2	1	$y=2$
3	3	3	T
3	1	1	$x=3 \vee y=1$

$x=2, y=3 \Rightarrow$

local condition

R _?	A	B
	1	2
	3	3

C-Table



