

```
In [1]: from pgmpy.models import BayesianNetwork
from pgmpy.inference import VariableElimination
```

```
In [8]: """
Visit_to_Asia
Tuberculosis
Smoker
Lung_Cancer
Bronchitis
TB_or_Lung_Cancer
Positive_X_ray
Dispnea
"""

q2mdl = BayesianNetwork(
    [
        ("Visit_to_Asia", "Tuberculosis"),
        ("Tuberculosis", "TB_or_Lung_Cancer"),
        ("TB_or_Lung_Cancer", "Positive_X_ray"),
        ("Smoker", "Lung_Cancer"),
        ("Lung_Cancer", "TB_or_Lung_Cancer"),
        ("Smoker", "Bronchitis"),
        ("Bronchitis", "Dispnea"),
        ("TB_or_Lung_Cancer", "Dispnea")
    ]
)

from pgmpy.factors.discrete import TabularCPD

cpd_Visit_to_Asia = TabularCPD(
    variable="Visit_to_Asia", variable_card=2, values=[[0.99], [0.01]])
)
cpd_Smoker = TabularCPD(
    variable="Smoker", variable_card=2, values=[[0.95], [0.05]])
)
cpd_Tuberculosis = TabularCPD(
    variable="Tuberculosis",
    variable_card=2,
    values=[[0.99, 0.95], [0.01, 0.05]],
    evidence=["Visit_to_Asia"],
    evidence_card=[2],
)
cpd_Lung_Cancer = TabularCPD(
    variable="Lung_Cancer",
    variable_card=2,
    values=[[0.99, 0.9], [0.01, 0.1]],
    evidence=["Smoker"],
    evidence_card=[2],
)
cpd_Bronchitis = TabularCPD(
    variable="Bronchitis",
    variable_card=2,
    values=[[0.7, 0.4], [0.3, 0.6]],
    evidence=["Smoker"],
    evidence_card=[2],
)
```

```

)
cpd_TB_or_Lung_Cancer = TabularCPD(
    variable="TB_or_Lung_Cancer",
    variable_card=2,
    values=[[1, 0, 0, 0], [0, 1, 1, 1]],
    evidence=["Lung_Cancer", "Tuberculosis"],
    evidence_card=[2, 2],
)
cpd_Disnea = TabularCPD(
    variable="Disnea",
    variable_card=2,
    values=[[0.9, 0.2, 0.3, 0.1], [0.1, 0.8, 0.7, 0.9]],
    evidence=["TB_or_Lung_Cancer", "Bronchitis"],
    evidence_card=[2, 2],
)
cpd_Positive_X_ray = TabularCPD(
    variable="Positive_X_ray",
    variable_card=2,
    values=[[0.95, 0.02], [0.05, 0.98]],
    evidence=["TB_or_Lung_Cancer"],
    evidence_card=[2],
)
q2mdl.add_cpds(cpd_Visit_to_Asia, cpd_Smoker, cpd_Tuberculosis, cpd_Lung_Cancer,
                 cpd_Bronchitis, cpd_TB_or_Lung_Cancer, cpd_Disnea, cpd_Positive_X_r

```

In [56]: `print(cpd_Tuberculosis)`

Visit_to_Asia	Visit_to_Asia(0)	Visit_to_Asia(1)
Tuberculosis(0)	0.99	0.95
Tuberculosis(1)	0.01	0.05

In [36]: `print(cpd_TB_or_Lung_Cancer)`

Lung_Cancer	Lung_Cancer(0)	Lung_Cancer(0)	Lung_Cancer(1)	Lung_Cancer(1)
Tuberculosis	Tuberculosis(0)	Tuberculosis(1)	Tuberculosis(0)	Tuberculosis(1)
TB_or_Lung_Cancer(0)	1.0	0.0	0.0	0.0
TB_or_Lung_Cancer(1)	0.0	1.0	1.0	1.0

In [93]: `print(cpd_DisPne)`

<code> TB_or_Lung_Cancer </code>	<code>TB_or_Lung_Cancer(0) </code>	<code>TB_or_Lung_Cancer(0) </code>	<code>TB_or_Lung_Cancer(1) </code>
<code> Bronchitis </code>	<code>Bronchitis(0) </code>	<code>Bronchitis(1) </code>	<code>Bronchitis(0) </code>
<code> Dispnea(0) </code>	<code>0.9 </code>	<code>0.2 </code>	<code>0.3 </code>
<code> 0.1 </code>			
<code> Dispnea(1) </code>	<code>0.1 </code>	<code>0.8 </code>	<code>0.7 </code>
<code> 0.9 </code>			

In [9]: `q2mdl.check_model()`

Out[9]: `True`

In [11]: `q2inf = VariableElimination(q2mdl)`

Q2 (I)

Does knowing Lung Cancer increase or decrease likelihood of Bronchitis?

In [43]: `q2mdl.local_independencies('Bronchitis')`

Out[43]: `(Bronchitis ⊥ Tuberculosis, Lung_Cancer, Visit_to_Asia, Positive_X_ray, TB_or_Lung_Cancer | Smoker)`

Q2 (I) Ans:

We can see that Bronchitis is independent of many parameters when Smoker is known/given. this means Bronchitis is dependent on Lung_Cancer when Smoker is not known/given, so Yes by knowing only Lung_Cancer there will be Increase or Decrease in likelihood of Bronchitis.

In [46]: `brinf = q2inf.query(variables=['Bronchitis'])
print(brinf)`

<code> Bronchitis </code>	<code>phi(Bronchitis) </code>
<code> Bronchitis(0) </code>	<code>0.6850 </code>
<code> Bronchitis(1) </code>	<code>0.3150 </code>

```
In [44]: brinf = q2inf.query(variables=['Bronchitis'], evidence={'Lung_Cancer':0})
print(brinf)
```

Bronchitis	phi(Bronchitis)
Bronchitis(0)	0.6863
Bronchitis(1)	0.3137

```
In [45]: brinf = q2inf.query(variables=['Bronchitis'], evidence={'Lung_Cancer':1})
print(brinf)
```

Bronchitis	phi(Bronchitis)
Bronchitis(0)	0.5966
Bronchitis(1)	0.4034

```
In [52]: brinf = q2inf.query(variables=['Bronchitis'], evidence={'Lung_Cancer':0,
                                                               'Smoker':0
                                                               })
print(brinf)
```

Bronchitis	phi(Bronchitis)
Bronchitis(0)	0.7000
Bronchitis(1)	0.3000

```
In [51]: brinf = q2inf.query(variables=['Bronchitis'], evidence={'Lung_Cancer':1,
                                                               'Smoker':0
                                                               })
print(brinf)
```

Bronchitis	phi(Bronchitis)
Bronchitis(0)	0.7000
Bronchitis(1)	0.3000

Q2 (II)

```
In [94]: tubinf2 = q2inf.query(variables=['Tuberculosis'],
                               evidence = {'Visit_to_Asia':1,
                                           'Lung_Cancer':1,
                                           'Positive_X_ray':1
                                           })
```

```
In [95]: print(tubinf2)
```

Tuberculosis	phi(Tuberculosis)
Tuberculosis(0)	0.9500
Tuberculosis(1)	0.0500

Q2 (II) Ans: 0.95

Q2 (III)

```
In [33]: q2mdl.local_independencies('Dispnea')
```

```
Out[33]: (Dispnea ⊥ Smoker, Lung_Cancer, Visit_to_Asia, Positive_X_ray, Tuberculosis | TB_or_Lung_Cancer, Bronchitis)
```

```
In [37]: print(cpd_Dispnea)
```

TB_or_Lung_Cancer	Bronchitis(0)	Bronchitis(1)	Bronchitis(0)
TB_or_Lung_Cancer(0)	0.9	0.2	0.3
TB_or_Lung_Cancer(1)	0.1		
Dispnea(0)	0.9	0.2	0.3
0.1			
Dispnea(1)	0.1	0.8	0.7
0.9			

```
In [38]: print(cpd_Positive_X_ray)
```

TB_or_Lung_Cancer	Positive_X_ray(0)	Positive_X_ray(1)
TB_or_Lung_Cancer(0)	0.95	0.05
TB_or_Lung_Cancer(1)	0.02	0.98

```
In [96]: disinf = q2inf.query(variables=['Dispnea'], evidence={'Positive_X_ray':1})
print(disinf)
```

Dispnea	phi(Dispnea)
Dispnea(0)	0.5297
Dispnea(1)	0.4703

Q2 (III) Ans: 0.5297

Q2 (IV) Ans:

```
In [10]: q2mdl.get_independencies()
```

```
Out[10]: (Positive_X_ray | Bronchitis | Smoker)
(Positive_X_ray | Smoker, Bronchitis | Lung_Cancer)
(Positive_X_ray | Visit_to_Asia | Tuberculosis)
(Positive_X_ray | Smoker, Bronchitis, Lung_Cancer, Visit_to_Asia, Tuberculosis, Dispnea | TB_or_Lung_Cancer)
(Positive_X_ray | Bronchitis | Lung_Cancer, Smoker)
(Positive_X_ray | Bronchitis | Visit_to_Asia, Smoker)
(Positive_X_ray | Visit_to_Asia, Bronchitis | Tuberculosis, Smoker)
(Positive_X_ray | Bronchitis, Lung_Cancer, Visit_to_Asia, Tuberculosis, Dispnea | TB_or_Lung_Cancer, Smoker)
(Positive_X_ray | Visit_to_Asia | Tuberculosis, Dispnea)
(Positive_X_ray | Smoker, Bronchitis, Lung_Cancer, Visit_to_Asia, Tuberculosis | TB_or_Lung_Cancer, Dispnea)
(Positive_X_ray | Smoker | Lung_Cancer, Bronchitis)
(Positive_X_ray | Visit_to_Asia | Tuberculosis, Bronchitis)
(Positive_X_ray | Smoker, Lung_Cancer, Visit_to_Asia, Tuberculosis, Dispnea | TB_or_Lung_Cancer, Bronchitis)
(Positive_X_ray | Smoker, Bronchitis | Lung_Cancer, Visit_to_Asia)
(Positive_X_ray | Visit_to_Asia, Smoker, Bronchitis | Lung_Cancer, Tuberculosis)
(Positive_X_ray | Smoker, Bronchitis, Visit_to_Asia, Tuberculosis, Dispnea | Lung_Cancer, TB_or_Lung_Cancer)
(Positive_X_ray | Smoker, Bronchitis, Lung_Cancer, Tuberculosis, Dispnea | Visit_to_Asia, TB_or_Lung_Cancer)
(Positive_X_ray | Smoker, Bronchitis, Lung_Cancer, Visit_to_Asia, Dispnea | TB_or_Lung_Cancer, Tuberculosis)
(Positive_X_ray | Visit_to_Asia | Tuberculosis, Smoker, Dispnea)
(Positive_X_ray | Lung_Cancer, Visit_to_Asia, Tuberculosis, Bronchitis | TB_or_Lung_Cancer, Smoker, Dispnea)
(Positive_X_ray | Visit_to_Asia | Tuberculosis, Smoker, Bronchitis)
(Positive_X_ray | Lung_Cancer, Visit_to_Asia, Tuberculosis, Dispnea | TB_or_Lung_Cancer, Smoker, Bronchitis)
(Positive_X_ray | Bronchitis | Lung_Cancer, Visit_to_Asia, Smoker)
(Positive_X_ray | Visit_to_Asia, Bronchitis | Lung_Cancer, Tuberculosis, Smoker)
(Positive_X_ray | Visit_to_Asia, Tuberculosis, Dispnea, Bronchitis | Lung_Cancer, TB_or_Lung_Cancer, Smoker)
(Positive_X_ray | Bronchitis | Visit_to_Asia, Tuberculosis, Smoker)
(Positive_X_ray | Lung_Cancer, Tuberculosis, Dispnea, Bronchitis | Visit_to_Asia, Smoker, TB_or_Lung_Cancer)
(Positive_X_ray | Lung_Cancer, Visit_to_Asia, Dispnea, Bronchitis | TB_or_Lung_Cancer, Tuberculosis, Smoker)
(Positive_X_ray | Smoker | Lung_Cancer, Dispnea, Bronchitis)
(Positive_X_ray | Visit_to_Asia | Tuberculosis, Dispnea, Bronchitis)
(Positive_X_ray | Lung_Cancer, Visit_to_Asia, Tuberculosis, Smoker | TB_or_Lung_Cancer, Dispnea, Bronchitis)
(Positive_X_ray | Visit_to_Asia | Lung_Cancer, Tuberculosis, Dispnea)
(Positive_X_ray | Visit_to_Asia, Tuberculosis, Smoker, Bronchitis | Lung_Cancer, TB_or_Lung_Cancer, Dispnea)
(Positive_X_ray | Lung_Cancer, Tuberculosis, Smoker, Bronchitis | Visit_to_Asia, TB_or_Lung_Cancer, Dispnea)
(Positive_X_ray | Lung_Cancer, Visit_to_Asia, Smoker, Bronchitis | TB_or_Lung_Cancer, Tuberculosis, Dispnea)
(Positive_X_ray | Smoker | Lung_Cancer, Visit_to_Asia, Bronchitis)
(Positive_X_ray | Visit_to_Asia, Smoker | Lung_Cancer, Tuberculosis, Bronchitis)
(Positive_X_ray | Visit_to_Asia, Tuberculosis, Smoker, Dispnea | Lung_Cancer, TB_or_Lung_Cancer, Bronchitis)
(Positive_X_ray | Lung_Cancer, Tuberculosis, Smoker, Dispnea | Visit_to_Asia, TB_or_Lung_Cancer, Dispnea)
```

r_Lung_Cancer, Bronchitis)
(Positive_X_ray | Lung_Cancer, Visit_to_Asia, Smoker, Dispnea | TB_or_Lung_Cancer, Tuberculosis, Bronchitis)
(Positive_X_ray | Smoker, Bronchitis | Lung_Cancer, Visit_to_Asia, Tuberculosis)
(Positive_X_ray | Tuberculosis, Smoker, Dispnea, Bronchitis | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer)
(Positive_X_ray | Visit_to_Asia, Smoker, Dispnea, Bronchitis | Lung_Cancer, TB_or_Lung_Cancer, Tuberculosis)
(Positive_X_ray | Lung_Cancer, Smoker, Dispnea, Bronchitis | Visit_to_Asia, Tuberculosis, TB_or_Lung_Cancer)
(Positive_X_ray | Visit_to_Asia | Tuberculosis, Smoker, Dispnea, Bronchitis)
(Positive_X_ray | Lung_Cancer, Visit_to_Asia, Tuberculosis | TB_or_Lung_Cancer, Smoker, Dispnea, Bronchitis)
(Positive_X_ray | Visit_to_Asia | Lung_Cancer, Tuberculosis, Smoker, Dispnea)
(Positive_X_ray | Visit_to_Asia, Tuberculosis, Bronchitis | Lung_Cancer, TB_or_Lung_Cancer, Smoker, Dispnea)
(Positive_X_ray | Lung_Cancer, Tuberculosis, Bronchitis | TB_or_Lung_Cancer, Visit_to_Asia, Smoker, Dispnea)
(Positive_X_ray | Lung_Cancer, Visit_to_Asia, Bronchitis | TB_or_Lung_Cancer, Tuberculosis, Smoker, Dispnea)
(Positive_X_ray | Visit_to_Asia | Lung_Cancer, Tuberculosis, Smoker, Bronchitis)
(Positive_X_ray | Visit_to_Asia, Tuberculosis, Dispnea | Lung_Cancer, TB_or_Lung_Cancer, Smoker, Bronchitis)
(Positive_X_ray | Lung_Cancer, Tuberculosis, Dispnea | Visit_to_Asia, Smoker, TB_or_Lung_Cancer, Bronchitis)
(Positive_X_ray | Lung_Cancer, Visit_to_Asia, Dispnea | TB_or_Lung_Cancer, Tuberculosis, Smoker, Bronchitis)
(Positive_X_ray | Bronchitis | Lung_Cancer, Visit_to_Asia, Tuberculosis, Smoker)
(Positive_X_ray | Tuberculosis, Dispnea, Bronchitis | Lung_Cancer, Visit_to_Asia, Smoker, TB_or_Lung_Cancer)
(Positive_X_ray | Visit_to_Asia, Dispnea, Bronchitis | Lung_Cancer, TB_or_Lung_Cancer, Tuberculosis, Smoker)
(Positive_X_ray | Lung_Cancer, Dispnea, Bronchitis | Visit_to_Asia, Tuberculosis, Smoker, TB_or_Lung_Cancer)
(Positive_X_ray | Smoker | Lung_Cancer, Visit_to_Asia, Dispnea, Bronchitis)
(Positive_X_ray | Visit_to_Asia, Smoker | Lung_Cancer, Tuberculosis, Dispnea, Bronchitis)
(Positive_X_ray | Visit_to_Asia, Tuberculosis, Smoker | Lung_Cancer, TB_or_Lung_Cancer, Smoker, Bronchitis)
(Positive_X_ray | Lung_Cancer, Visit_to_Asia, Smoker | TB_or_Lung_Cancer, Tuberculosis, Dispnea, Bronchitis)
(Positive_X_ray | Tuberculosis, Smoker, Bronchitis | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Dispnea)
(Positive_X_ray | Visit_to_Asia, Smoker, Bronchitis | Lung_Cancer, TB_or_Lung_Cancer, Smoker, Tuberculosis, Dispnea)
(Positive_X_ray | Lung_Cancer, Smoker, Bronchitis | Visit_to_Asia, Tuberculosis, TB_or_Lung_Cancer, Dispnea)
(Positive_X_ray | Smoker | Lung_Cancer, Visit_to_Asia, Tuberculosis, Bronchitis)
(Positive_X_ray | Tuberculosis, Smoker, Dispnea | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Bronchitis)
(Positive_X_ray | Visit_to_Asia, Smoker, Dispnea | Lung_Cancer, TB_or_Lung_Cancer, Tuberculosis, Bronchitis)
(Positive_X_ray | Lung_Cancer, Smoker, Dispnea | Visit_to_Asia, Tuberculosis, TB_or_Lung_Cancer, Bronchitis)

(Positive_X_ray \perp Smoker, Dispnea, Bronchitis | Lung_Cancer, Visit_to_Asia, Tuberculosis, TB_or_Lung_Cancer)
(Positive_X_ray \perp Visit_to_Asia | Lung_Cancer, Smoker, Bronchitis, Tuberculosis, Dispnea)
(Positive_X_ray \perp Visit_to_Asia, Tuberculosis | Lung_Cancer, TB_or_Lung_Cancer, Smoker, Bronchitis, Dispnea)
(Positive_X_ray \perp Lung_Cancer, Tuberculosis | TB_or_Lung_Cancer, Visit_to_Asia, Smoker, Bronchitis, Dispnea)
(Positive_X_ray \perp Lung_Cancer, Visit_to_Asia | TB_or_Lung_Cancer, Smoker, Bronchitis, Tuberculosis, Dispnea)
(Positive_X_ray \perp Tuberculosis, Bronchitis | Lung_Cancer, TB_or_Lung_Cancer, Visit_to_Asia, Smoker, Dispnea)
(Positive_X_ray \perp Visit_to_Asia, Bronchitis | Lung_Cancer, TB_or_Lung_Cancer, Smoker, Tuberculosis, Dispnea)
(Positive_X_ray \perp Lung_Cancer, Bronchitis | TB_or_Lung_Cancer, Visit_to_Asia, Smoker, Tuberculosis, Dispnea)
(Positive_X_ray \perp Tuberculosis, Dispnea | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Bronchitis)
(Positive_X_ray \perp Visit_to_Asia, Dispnea | Lung_Cancer, TB_or_Lung_Cancer, Smoker, Bronchitis, Tuberculosis)
(Positive_X_ray \perp Lung_Cancer, Dispnea | Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Bronchitis, Tuberculosis)
(Positive_X_ray \perp Dispnea, Bronchitis | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Tuberculosis)
(Positive_X_ray \perp Smoker | Lung_Cancer, Visit_to_Asia, Bronchitis, Tuberculosis, Dispnea)
(Positive_X_ray \perp Tuberculosis, Smoker | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Bronchitis, Dispnea)
(Positive_X_ray \perp Visit_to_Asia, Smoker | Lung_Cancer, TB_or_Lung_Cancer, Bronchitis, Tuberculosis, Dispnea)
(Positive_X_ray \perp Lung_Cancer, Smoker | Visit_to_Asia, TB_or_Lung_Cancer, Bronchitis, Tuberculosis, Dispnea)
(Positive_X_ray \perp Smoker, Bronchitis | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Tuberculosis, Dispnea)
(Positive_X_ray \perp Smoker, Dispnea | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Bronchitis, Tuberculosis)
(Positive_X_ray \perp Tuberculosis | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Bronchitis, Dispnea)
(Positive_X_ray \perp Visit_to_Asia | Lung_Cancer, TB_or_Lung_Cancer, Smoker, Bronchitis, Tuberculosis, Dispnea)
(Positive_X_ray \perp Lung_Cancer | Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Bronchitis, Tuberculosis, Dispnea)
(Positive_X_ray \perp Bronchitis | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Tuberculosis, Dispnea)
(Positive_X_ray \perp Dispnea | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Bronchitis, Tuberculosis)
(Positive_X_ray \perp Smoker | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Bronchitis, Tuberculosis, Dispnea)
(Lung_Cancer \perp Visit_to_Asia, Tuberculosis)
(Lung_Cancer \perp Visit_to_Asia, Tuberculosis, Bronchitis | Smoker)
(Lung_Cancer \perp Visit_to_Asia, Tuberculosis | Bronchitis)
(Lung_Cancer \perp Visit_to_Asia | Tuberculosis)
(Lung_Cancer \perp Tuberculosis | Visit_to_Asia)
(Lung_Cancer \perp Positive_X_ray | TB_or_Lung_Cancer)
(Lung_Cancer \perp Visit_to_Asia, Tuberculosis | Smoker, Bronchitis)
(Lung_Cancer \perp Visit_to_Asia, Bronchitis | Tuberculosis, Smoker)

(Lung_Cancer \perp Tuberculosis, Bronchitis | Visit_to_Asia, Smoker)
(Lung_Cancer \perp Bronchitis | Positive_X_ray, Smoker)
(Lung_Cancer \perp Positive_X_ray, Dispnea, Bronchitis | TB_or_Lung_Cancer, Smoker)
(Lung_Cancer \perp Visit_to_Asia | Tuberculosis, Dispnea)
(Lung_Cancer \perp Positive_X_ray | TB_or_Lung_Cancer, Dispnea)
(Lung_Cancer \perp Visit_to_Asia | Tuberculosis, Bronchitis)
(Lung_Cancer \perp Tuberculosis | Visit_to_Asia, Bronchitis)
(Lung_Cancer \perp Positive_X_ray, Dispnea | TB_or_Lung_Cancer, Bronchitis)
(Lung_Cancer \perp Visit_to_Asia | Positive_X_ray, Tuberculosis)
(Lung_Cancer \perp Visit_to_Asia, Positive_X_ray | TB_or_Lung_Cancer, Tuberculosis)
(Lung_Cancer \perp Positive_X_ray | Visit_to_Asia, TB_or_Lung_Cancer)
(Lung_Cancer \perp Visit_to_Asia | Tuberculosis, Smoker, Dispnea)
(Lung_Cancer \perp Positive_X_ray, Bronchitis | TB_or_Lung_Cancer, Smoker, Dispnea)
(Lung_Cancer \perp Visit_to_Asia | Tuberculosis, Smoker, Bronchitis)
(Lung_Cancer \perp Tuberculosis | Visit_to_Asia, Smoker, Bronchitis)
(Lung_Cancer \perp Positive_X_ray, Dispnea | TB_or_Lung_Cancer, Smoker, Bronchitis)
(Lung_Cancer \perp Bronchitis | Visit_to_Asia, Tuberculosis, Smoker)
(Lung_Cancer \perp Visit_to_Asia, Bronchitis | Positive_X_ray, Tuberculosis, Smoker)
(Lung_Cancer \perp Visit_to_Asia, Positive_X_ray, Dispnea, Bronchitis | TB_or_Lung_Cancer, Tuberculosis, Smoker)
(Lung_Cancer \perp Bronchitis | Visit_to_Asia, Positive_X_ray, Smoker)
(Lung_Cancer \perp Positive_X_ray, Dispnea, Bronchitis | Visit_to_Asia, Smoker, TB_or_Lung_Cancer)
(Lung_Cancer \perp Dispnea, Bronchitis | TB_or_Lung_Cancer, Positive_X_ray, Smoker)
(Lung_Cancer \perp Visit_to_Asia | Tuberculosis, Dispnea, Bronchitis)
(Lung_Cancer \perp Positive_X_ray | TB_or_Lung_Cancer, Dispnea, Bronchitis)
(Lung_Cancer \perp Visit_to_Asia | Positive_X_ray, Tuberculosis, Dispnea)
(Lung_Cancer \perp Visit_to_Asia, Positive_X_ray | TB_or_Lung_Cancer, Tuberculosis, Dispnea)
(Lung_Cancer \perp Positive_X_ray, Dispnea | Visit_to_Asia, TB_or_Lung_Cancer, Tuberculosis, Dispnea)
(Lung_Cancer \perp Positive_X_ray | Visit_to_Asia, TB_or_Lung_Cancer, Dispnea)
(Lung_Cancer \perp Visit_to_Asia | Positive_X_ray, Tuberculosis, Bronchitis)
(Lung_Cancer \perp Visit_to_Asia, Positive_X_ray, Dispnea | TB_or_Lung_Cancer, Tuberculosis, Bronchitis)
(Lung_Cancer \perp Positive_X_ray, Dispnea | Visit_to_Asia, TB_or_Lung_Cancer, Bronchitis)
(Lung_Cancer \perp Dispnea | TB_or_Lung_Cancer, Positive_X_ray, Bronchitis)
(Lung_Cancer \perp Positive_X_ray | Visit_to_Asia, Tuberculosis, TB_or_Lung_Cancer)
(Lung_Cancer \perp Visit_to_Asia | Positive_X_ray, Tuberculosis, TB_or_Lung_Cancer)
(Lung_Cancer \perp Visit_to_Asia | Tuberculosis, Smoker, Dispnea, Bronchitis)
(Lung_Cancer \perp Positive_X_ray | TB_or_Lung_Cancer, Smoker, Dispnea, Bronchitis)
(Lung_Cancer \perp Visit_to_Asia | Positive_X_ray, Tuberculosis, Smoker, Dispnea)
(Lung_Cancer \perp Visit_to_Asia, Positive_X_ray, Bronchitis | TB_or_Lung_Cancer, Tuberculosis, Smoker, Dispnea)
(Lung_Cancer \perp Positive_X_ray, Bronchitis | TB_or_Lung_Cancer, Visit_to_Asia, Smoker, Dispnea)
(Lung_Cancer \perp Bronchitis | TB_or_Lung_Cancer, Positive_X_ray, Smoker, Dispnea)
(Lung_Cancer \perp Visit_to_Asia | Positive_X_ray, Tuberculosis, Smoker, Bronchitis)
(Lung_Cancer \perp Visit_to_Asia, Positive_X_ray, Dispnea | TB_or_Lung_Cancer, Tuberculosis, Smoker, Bronchitis)
(Lung_Cancer \perp Positive_X_ray, Dispnea | Visit_to_Asia, Smoker, TB_or_Lung_Cancer, Bronchitis)
(Lung_Cancer \perp Dispnea | TB_or_Lung_Cancer, Positive_X_ray, Smoker, Bronchitis)
(Lung_Cancer \perp Bronchitis | Visit_to_Asia, Tuberculosis, Smoker, Positive_X_ray)
(Lung_Cancer \perp Positive_X_ray, Dispnea, Bronchitis | Visit_to_Asia, Tuberculosis, Smoker, TB_or_Lung_Cancer)
(Lung_Cancer \perp Visit_to_Asia, Dispnea, Bronchitis | Positive_X_ray, Tuberculosis,

Smoker, TB_or_Lung_Cancer)
(Lung_Cancer | Dispnea, Bronchitis | Visit_to_Asia, Positive_X_ray, Smoker, TB_or_Lung_Cancer)
(Lung_Cancer | Visit_to_Asia | Positive_X_ray, Tuberculosis, Dispnea, Bronchitis)
(Lung_Cancer | Visit_to_Asia, Positive_X_ray | TB_or_Lung_Cancer, Tuberculosis, Dispnea, Bronchitis)
(Lung_Cancer | Positive_X_ray | Visit_to_Asia, TB_or_Lung_Cancer, Dispnea, Bronchitis)
(Lung_Cancer | Positive_X_ray | Visit_to_Asia, Tuberculosis, TB_or_Lung_Cancer, Dispnea)
(Lung_Cancer | Visit_to_Asia | Positive_X_ray, Tuberculosis, TB_or_Lung_Cancer, Dispnea)
(Lung_Cancer | Positive_X_ray, Dispnea | Visit_to_Asia, Tuberculosis, TB_or_Lung_Cancer, Bronchitis)
(Lung_Cancer | Visit_to_Asia, Dispnea | Positive_X_ray, Tuberculosis, TB_or_Lung_Cancer, Bronchitis)
(Lung_Cancer | Dispnea | Visit_to_Asia, Positive_X_ray, TB_or_Lung_Cancer, Bronchitis)
(Lung_Cancer | Visit_to_Asia | Tuberculosis, Smoker, Bronchitis, Positive_X_ray, Dispnea)
(Lung_Cancer | Visit_to_Asia, Positive_X_ray | TB_or_Lung_Cancer, Smoker, Bronchitis, Tuberculosis, Dispnea)
(Lung_Cancer | Positive_X_ray | TB_or_Lung_Cancer, Visit_to_Asia, Smoker, Bronchitis, Dispnea)
(Lung_Cancer | Positive_X_ray, Bronchitis | TB_or_Lung_Cancer, Visit_to_Asia, Smoker, Tuberculosis, Dispnea)
(Lung_Cancer | Visit_to_Asia, Bronchitis | TB_or_Lung_Cancer, Tuberculosis, Smoker, Positive_X_ray, Dispnea)
(Lung_Cancer | Bronchitis | TB_or_Lung_Cancer, Visit_to_Asia, Smoker, Positive_X_ray, Dispnea)
(Lung_Cancer | Positive_X_ray, Dispnea | Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Bronchitis, Tuberculosis)
(Lung_Cancer | Visit_to_Asia, Dispnea | TB_or_Lung_Cancer, Tuberculosis, Smoker, Bronchitis, Positive_X_ray)
(Lung_Cancer | Dispnea | Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Bronchitis, Positive_X_ray)
(Lung_Cancer | Dispnea, Bronchitis | Positive_X_ray, Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Tuberculosis)
(Lung_Cancer | Positive_X_ray | Visit_to_Asia, TB_or_Lung_Cancer, Bronchitis, Tuberculosis, Dispnea)
(Lung_Cancer | Visit_to_Asia | TB_or_Lung_Cancer, Tuberculosis, Bronchitis, Positive_X_ray, Dispnea)
(Lung_Cancer | Dispnea | Visit_to_Asia, Tuberculosis, TB_or_Lung_Cancer, Bronchitis, Positive_X_ray)
(Lung_Cancer | Visit_to_Asia | TB_or_Lung_Cancer, Tuberculosis, Smoker, Bronchitis, Positive_X_ray, Dispnea)
(Lung_Cancer | Bronchitis | Positive_X_ray, Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Tuberculosis, Dispnea)
(Lung_Cancer | Dispnea | Visit_to_Asia, Tuberculosis, TB_or_Lung_Cancer, Smoker, Bronchitis, Positive_X_ray)
(Visit_to_Asia | Lung_Cancer, Smoker, Bronchitis)
(Visit_to_Asia | Lung_Cancer, Bronchitis | Smoker)
(Visit_to_Asia | Lung_Cancer, Smoker | Bronchitis)
(Visit_to_Asia | Smoker, Bronchitis | Lung_Cancer)

(Visit_to_Asia | Positive_X_ray | TB_or_Lung_Cancer)
(Visit_to_Asia | Smoker, Bronchitis, Lung_Cancer, TB_or_Lung_Cancer, Positive_X_ray, Dispnea | Tuberculosis)
(Visit_to_Asia | Lung_Cancer | Smoker, Bronchitis)
(Visit_to_Asia | Bronchitis | Lung_Cancer, Smoker)
(Visit_to_Asia | Positive_X_ray, Dispnea, Bronchitis | TB_or_Lung_Cancer, Smoker)
(Visit_to_Asia | Bronchitis | Positive_X_ray, Smoker)
(Visit_to_Asia | Bronchitis, Lung_Cancer, TB_or_Lung_Cancer, Positive_X_ray, Dispnea | Tuberculosis, Smoker)
(Visit_to_Asia | Positive_X_ray | TB_or_Lung_Cancer, Dispnea)
(Visit_to_Asia | Smoker, Bronchitis, Lung_Cancer, TB_or_Lung_Cancer, Positive_X_ray | Tuberculosis, Dispnea)
(Visit_to_Asia | Smoker | Lung_Cancer, Bronchitis)
(Visit_to_Asia | Positive_X_ray, Dispnea | TB_or_Lung_Cancer, Bronchitis)
(Visit_to_Asia | Smoker, Lung_Cancer, TB_or_Lung_Cancer, Positive_X_ray, Dispnea | Tuberculosis, Bronchitis)
(Visit_to_Asia | Positive_X_ray, Smoker, Dispnea, Bronchitis | Lung_Cancer, TB_or_Lung_Cancer)
(Visit_to_Asia | Smoker, Bronchitis | Lung_Cancer, Positive_X_ray)
(Visit_to_Asia | Smoker, Bronchitis, TB_or_Lung_Cancer, Positive_X_ray, Dispnea | Lung_Cancer, Tuberculosis)
(Visit_to_Asia | Smoker, Bronchitis, Lung_Cancer, Positive_X_ray, Dispnea | TB_or_Lung_Cancer, Tuberculosis)
(Visit_to_Asia | Smoker, Bronchitis, Lung_Cancer, TB_or_Lung_Cancer, Dispnea | Positive_X_ray, Tuberculosis)
(Visit_to_Asia | Positive_X_ray, Bronchitis | TB_or_Lung_Cancer, Smoker, Dispnea)
(Visit_to_Asia | Lung_Cancer, TB_or_Lung_Cancer, Positive_X_ray, Bronchitis | Tuberculosis, Smoker, Dispnea)
(Visit_to_Asia | Positive_X_ray, Dispnea | TB_or_Lung_Cancer, Smoker, Bronchitis)
(Visit_to_Asia | Lung_Cancer, TB_or_Lung_Cancer, Positive_X_ray, Dispnea | Tuberculosis, Smoker, Bronchitis)
(Visit_to_Asia | Positive_X_ray, Dispnea, Bronchitis | Lung_Cancer, TB_or_Lung_Cancer, Smoker)
(Visit_to_Asia | Bronchitis | Lung_Cancer, Positive_X_ray, Smoker)
(Visit_to_Asia | TB_or_Lung_Cancer, Positive_X_ray, Dispnea, Bronchitis | Lung_Cancer, Tuberculosis, Smoker)
(Visit_to_Asia | Dispnea, Bronchitis | TB_or_Lung_Cancer, Positive_X_ray, Smoker)
(Visit_to_Asia | Lung_Cancer, Positive_X_ray, Dispnea, Bronchitis | TB_or_Lung_Cancer, Tuberculosis, Smoker)
(Visit_to_Asia | Lung_Cancer, TB_or_Lung_Cancer, Dispnea, Bronchitis | Positive_X_ray, Smoker, Tuberculosis)
(Visit_to_Asia | Smoker | Lung_Cancer, Dispnea, Bronchitis)
(Visit_to_Asia | Positive_X_ray | TB_or_Lung_Cancer, Dispnea, Bronchitis)
(Visit_to_Asia | Lung_Cancer, TB_or_Lung_Cancer, Positive_X_ray, Smoker | Tuberculosis, Dispnea, Bronchitis)
(Visit_to_Asia | Positive_X_ray, Smoker, Bronchitis | Lung_Cancer, TB_or_Lung_Cancer, Smoker, Dispnea)
(Visit_to_Asia | TB_or_Lung_Cancer, Positive_X_ray, Smoker, Bronchitis | Lung_Cancer, Tuberculosis, Dispnea)
(Visit_to_Asia | Lung_Cancer, Positive_X_ray, Smoker, Bronchitis | TB_or_Lung_Cancer, Smoker, Dispnea)
(Visit_to_Asia | Lung_Cancer, TB_or_Lung_Cancer, Smoker, Bronchitis | Tuberculosis, Positive_X_ray, Dispnea)
(Visit_to_Asia | Positive_X_ray, Smoker, Dispnea | Lung_Cancer, TB_or_Lung_Cancer, Bronchitis)
(Visit_to_Asia | Smoker | Lung_Cancer, Positive_X_ray, Bronchitis)

(Visit_to_Asia \perp TB_or_Lung_Cancer, Positive_X_ray, Smoker, Dispnea $|$ Lung_Cancer, Tuberculosis, Bronchitis)
(Visit_to_Asia \perp Dispnea $|$ TB_or_Lung_Cancer, Positive_X_ray, Bronchitis)
(Visit_to_Asia \perp Lung_Cancer, Positive_X_ray, Smoker, Dispnea $|$ TB_or_Lung_Cancer, Tuberculosis, Bronchitis)
(Visit_to_Asia \perp Lung_Cancer, TB_or_Lung_Cancer, Smoker, Dispnea $|$ Positive_X_ray, Tuberculosis, Bronchitis)
(Visit_to_Asia \perp Smoker, Dispnea, Bronchitis $|$ Lung_Cancer, TB_or_Lung_Cancer, Positive_X_ray)
(Visit_to_Asia \perp Positive_X_ray, Smoker, Dispnea, Bronchitis $|$ Lung_Cancer, TB_or_Lung_Cancer, Tuberculosis)
(Visit_to_Asia \perp TB_or_Lung_Cancer, Smoker, Dispnea, Bronchitis $|$ Lung_Cancer, Positive_X_ray, Tuberculosis)
(Visit_to_Asia \perp Lung_Cancer, Smoker, Dispnea, Bronchitis $|$ TB_or_Lung_Cancer, Positive_X_ray, Tuberculosis)
(Visit_to_Asia \perp Positive_X_ray $|$ TB_or_Lung_Cancer, Smoker, Dispnea, Bronchitis)
(Visit_to_Asia \perp Lung_Cancer, TB_or_Lung_Cancer, Positive_X_ray $|$ Tuberculosis, Smoker, Dispnea, Bronchitis)
(Visit_to_Asia \perp Positive_X_ray, Bronchitis $|$ Lung_Cancer, TB_or_Lung_Cancer, Smoker, Dispnea)
(Visit_to_Asia \perp TB_or_Lung_Cancer, Positive_X_ray, Bronchitis $|$ Lung_Cancer, Tuberculosis, Smoker, Dispnea)
(Visit_to_Asia \perp Bronchitis $|$ TB_or_Lung_Cancer, Positive_X_ray, Smoker, Dispnea)
(Visit_to_Asia \perp Lung_Cancer, Positive_X_ray, Bronchitis $|$ TB_or_Lung_Cancer, Tuberculosis, Smoker, Dispnea)
(Visit_to_Asia \perp Lung_Cancer, TB_or_Lung_Cancer, Bronchitis $|$ Tuberculosis, Positive_X_ray, Smoker, Dispnea)
(Visit_to_Asia \perp Positive_X_ray, Dispnea $|$ Lung_Cancer, TB_or_Lung_Cancer, Smoker, Bronchitis)
(Visit_to_Asia \perp TB_or_Lung_Cancer, Positive_X_ray, Dispnea $|$ Lung_Cancer, Tuberculosis, Smoker, Bronchitis)
(Visit_to_Asia \perp Dispnea $|$ TB_or_Lung_Cancer, Positive_X_ray, Smoker, Bronchitis)
(Visit_to_Asia \perp Lung_Cancer, Positive_X_ray, Dispnea $|$ TB_or_Lung_Cancer, Tuberculosis, Smoker, Bronchitis)
(Visit_to_Asia \perp Lung_Cancer, TB_or_Lung_Cancer, Dispnea $|$ Positive_X_ray, Smoker, Tuberculosis, Bronchitis)
(Visit_to_Asia \perp Dispnea, Bronchitis $|$ Lung_Cancer, TB_or_Lung_Cancer, Positive_X_ray, Smoker)
(Visit_to_Asia \perp Positive_X_ray, Dispnea, Bronchitis $|$ Lung_Cancer, TB_or_Lung_Cancer, Tuberculosis, Smoker)
(Visit_to_Asia \perp TB_or_Lung_Cancer, Dispnea, Bronchitis $|$ Lung_Cancer, Positive_X_ray, Smoker, Tuberculosis)
(Visit_to_Asia \perp Lung_Cancer, Dispnea, Bronchitis $|$ TB_or_Lung_Cancer, Positive_X_ray, Smoker, Tuberculosis)
(Visit_to_Asia \perp Positive_X_ray, Smoker $|$ Lung_Cancer, TB_or_Lung_Cancer, Dispnea, Bronchitis)
(Visit_to_Asia \perp Smoker $|$ Lung_Cancer, Positive_X_ray, Dispnea, Bronchitis)
(Visit_to_Asia \perp TB_or_Lung_Cancer, Positive_X_ray, Smoker $|$ Lung_Cancer, Tuberculosis, Dispnea, Bronchitis)
(Visit_to_Asia \perp Lung_Cancer, Positive_X_ray, Smoker $|$ TB_or_Lung_Cancer, Tuberculosis, Dispnea, Bronchitis)
(Visit_to_Asia \perp Lung_Cancer, Positive_X_ray, Smoker $|$ TB_or_Lung_Cancer, Tuberculosis, Dispnea, Bronchitis)
(Visit_to_Asia \perp Lung_Cancer, TB_or_Lung_Cancer, Smoker $|$ Tuberculosis, Positive_X_ray, Dispnea, Bronchitis)
(Visit_to_Asia \perp Smoker, Bronchitis $|$ Lung_Cancer, TB_or_Lung_Cancer, Positive_X_ray, Dispnea)
(Visit_to_Asia \perp Positive_X_ray, Smoker, Bronchitis $|$ Lung_Cancer, TB_or_Lung_Cancer, Positive_X_ray)

er, Tuberculosis, Dispnea)
(Visit_to_Asia | TB_or_Lung_Cancer, Smoker, Bronchitis | Tuberculosis, Lung_Cancer, Positive_X_ray, Dispnea)
(Visit_to_Asia | Lung_Cancer, Smoker, Bronchitis | Tuberculosis, TB_or_Lung_Cancer, Positive_X_ray, Dispnea)
(Visit_to_Asia | Smoker, Dispnea | Lung_Cancer, TB_or_Lung_Cancer, Positive_X_ray, Bronchitis)
(Visit_to_Asia | Positive_X_ray, Smoker, Dispnea | Lung_Cancer, TB_or_Lung_Cancer, Tuberculosis, Bronchitis)
(Visit_to_Asia | TB_or_Lung_Cancer, Smoker, Dispnea | Lung_Cancer, Positive_X_ray, Tuberculosis, Bronchitis)
(Visit_to_Asia | Lung_Cancer, Smoker, Dispnea | TB_or_Lung_Cancer, Positive_X_ray, Tuberculosis, Bronchitis)
(Visit_to_Asia | Smoker, Dispnea, Bronchitis | Lung_Cancer, TB_or_Lung_Cancer, Positive_X_ray, Tuberculosis)
(Visit_to_Asia | Positive_X_ray | Lung_Cancer, TB_or_Lung_Cancer, Smoker, Bronchitis, Dispnea)
(Visit_to_Asia | TB_or_Lung_Cancer, Positive_X_ray | Lung_Cancer, Smoker, Bronchitis, Tuberculosis, Dispnea)
(Visit_to_Asia | Lung_Cancer, Positive_X_ray | TB_or_Lung_Cancer, Smoker, Bronchitis, Tuberculosis, Dispnea)
(Visit_to_Asia | Lung_Cancer, TB_or_Lung_Cancer | Positive_X_ray, Smoker, Bronchitis, Tuberculosis, Dispnea)
(Visit_to_Asia | Bronchitis | Lung_Cancer, TB_or_Lung_Cancer, Smoker, Positive_X_ray, Dispnea)
(Visit_to_Asia | Positive_X_ray, Bronchitis | Lung_Cancer, TB_or_Lung_Cancer, Smoker, Tuberculosis, Dispnea)
(Visit_to_Asia | TB_or_Lung_Cancer, Bronchitis | Positive_X_ray, Lung_Cancer, Smoker, Tuberculosis, Dispnea)
(Visit_to_Asia | Lung_Cancer, Bronchitis | Positive_X_ray, TB_or_Lung_Cancer, Smoker, Tuberculosis, Dispnea)
(Visit_to_Asia | Dispnea | Lung_Cancer, TB_or_Lung_Cancer, Smoker, Bronchitis, Positive_X_ray)
(Visit_to_Asia | Positive_X_ray, Dispnea | Lung_Cancer, TB_or_Lung_Cancer, Smoker, Bronchitis, Tuberculosis)
(Visit_to_Asia | TB_or_Lung_Cancer, Dispnea | Lung_Cancer, Tuberculosis, Smoker, Bronchitis, Positive_X_ray)
(Visit_to_Asia | Lung_Cancer, Dispnea | TB_or_Lung_Cancer, Tuberculosis, Smoker, Bronchitis, Positive_X_ray)
(Visit_to_Asia | Dispnea, Bronchitis | Lung_Cancer, TB_or_Lung_Cancer, Tuberculosis, Smoker, Positive_X_ray)
(Visit_to_Asia | Smoker | Lung_Cancer, TB_or_Lung_Cancer, Bronchitis, Positive_X_ray, Dispnea)
(Visit_to_Asia | Positive_X_ray, Smoker | Lung_Cancer, TB_or_Lung_Cancer, Bronchitis, Tuberculosis, Dispnea)
(Visit_to_Asia | TB_or_Lung_Cancer, Smoker | Positive_X_ray, Lung_Cancer, Bronchitis, Tuberculosis, Dispnea)
(Visit_to_Asia | Lung_Cancer, Smoker | Positive_X_ray, TB_or_Lung_Cancer, Bronchitis, Tuberculosis, Dispnea)
(Visit_to_Asia | Smoker, Bronchitis | Positive_X_ray, Lung_Cancer, TB_or_Lung_Cancer, Bronchitis, Tuberculosis, Dispnea)
(Visit_to_Asia | Smoker, Dispnea | Lung_Cancer, TB_or_Lung_Cancer, Tuberculosis, Bronchitis, Positive_X_ray)
(Visit_to_Asia | Positive_X_ray | Lung_Cancer, TB_or_Lung_Cancer, Smoker, Bronchitis, Tuberculosis, Dispnea)
(Visit_to_Asia | TB_or_Lung_Cancer | Lung_Cancer, Tuberculosis, Smoker, Bronchitis)

s, Positive_X_ray, Dispnea)
(Visit_to_Asia \perp Lung_Cancer | TB_or_Lung_Cancer, Tuberculosis, Smoker, Bronchitis, Positive_X_ray, Dispnea)
(Visit_to_Asia \perp Bronchitis | Lung_Cancer, TB_or_Lung_Cancer, Tuberculosis, Smoker, Positive_X_ray, Dispnea)
(Visit_to_Asia \perp Dispnea | Lung_Cancer, TB_or_Lung_Cancer, Tuberculosis, Smoker, Bronchitis, Positive_X_ray)
(Visit_to_Asia \perp Smoker | Lung_Cancer, TB_or_Lung_Cancer, Tuberculosis, Bronchitis, Positive_X_ray, Dispnea)
(TB_or_Lung_Cancer \perp Bronchitis | Smoker)
(TB_or_Lung_Cancer \perp Smoker, Bronchitis | Lung_Cancer)
(TB_or_Lung_Cancer \perp Visit_to_Asia | Tuberculosis)
(TB_or_Lung_Cancer \perp Bronchitis | Lung_Cancer, Smoker)
(TB_or_Lung_Cancer \perp Bronchitis | Visit_to_Asia, Smoker)
(TB_or_Lung_Cancer \perp Bronchitis | Positive_X_ray, Smoker)
(TB_or_Lung_Cancer \perp Visit_to_Asia, Bronchitis | Tuberculosis, Smoker)
(TB_or_Lung_Cancer \perp Visit_to_Asia | Tuberculosis, Dispnea)
(TB_or_Lung_Cancer \perp Smoker | Lung_Cancer, Bronchitis)
(TB_or_Lung_Cancer \perp Visit_to_Asia | Tuberculosis, Bronchitis)
(TB_or_Lung_Cancer \perp Smoker, Bronchitis | Lung_Cancer, Visit_to_Asia)
(TB_or_Lung_Cancer \perp Smoker, Bronchitis | Lung_Cancer, Positive_X_ray)
(TB_or_Lung_Cancer \perp Visit_to_Asia, Smoker, Bronchitis | Lung_Cancer, Tuberculosis)
(TB_or_Lung_Cancer \perp Visit_to_Asia | Positive_X_ray, Tuberculosis)
(TB_or_Lung_Cancer \perp Visit_to_Asia | Tuberculosis, Smoker, Dispnea)
(TB_or_Lung_Cancer \perp Visit_to_Asia | Tuberculosis, Smoker, Bronchitis)
(TB_or_Lung_Cancer \perp Bronchitis | Lung_Cancer, Visit_to_Asia, Smoker)
(TB_or_Lung_Cancer \perp Bronchitis | Lung_Cancer, Positive_X_ray, Smoker)
(TB_or_Lung_Cancer \perp Visit_to_Asia, Bronchitis | Lung_Cancer, Tuberculosis, Smoker)
(TB_or_Lung_Cancer \perp Bronchitis | Visit_to_Asia, Positive_X_ray, Smoker)
(TB_or_Lung_Cancer \perp Bronchitis | Visit_to_Asia, Tuberculosis, Smoker)
(TB_or_Lung_Cancer \perp Visit_to_Asia, Bronchitis | Positive_X_ray, Smoker, Tuberculosis)
(TB_or_Lung_Cancer \perp Smoker | Lung_Cancer, Dispnea, Bronchitis)
(TB_or_Lung_Cancer \perp Visit_to_Asia | Tuberculosis, Dispnea, Bronchitis)
(TB_or_Lung_Cancer \perp Visit_to_Asia | Lung_Cancer, Tuberculosis, Dispnea)
(TB_or_Lung_Cancer \perp Visit_to_Asia | Tuberculosis, Positive_X_ray, Dispnea)
(TB_or_Lung_Cancer \perp Smoker | Lung_Cancer, Visit_to_Asia, Bronchitis)
(TB_or_Lung_Cancer \perp Smoker | Lung_Cancer, Positive_X_ray, Bronchitis)
(TB_or_Lung_Cancer \perp Visit_to_Asia, Smoker | Lung_Cancer, Tuberculosis, Bronchitis)
(TB_or_Lung_Cancer \perp Visit_to_Asia | Positive_X_ray, Tuberculosis, Bronchitis)
(TB_or_Lung_Cancer \perp Smoker, Bronchitis | Lung_Cancer, Visit_to_Asia, Positive_X_ray)
(TB_or_Lung_Cancer \perp Smoker, Bronchitis | Lung_Cancer, Visit_to_Asia, Tuberculosis)
(TB_or_Lung_Cancer \perp Visit_to_Asia, Smoker, Bronchitis | Lung_Cancer, Positive_X_ray, Tuberculosis)
(TB_or_Lung_Cancer \perp Visit_to_Asia | Tuberculosis, Smoker, Dispnea, Bronchitis)
(TB_or_Lung_Cancer \perp Visit_to_Asia | Lung_Cancer, Tuberculosis, Smoker, Dispnea)
(TB_or_Lung_Cancer \perp Visit_to_Asia | Tuberculosis, Positive_X_ray, Smoker, Dispnea)
(TB_or_Lung_Cancer \perp Visit_to_Asia | Lung_Cancer, Tuberculosis, Smoker, Bronchitis)
(TB_or_Lung_Cancer \perp Visit_to_Asia | Positive_X_ray, Smoker, Tuberculosis, Bronchitis)

tis)
(TB_or_Lung_Cancer \perp Bronchitis | Lung_Cancer, Visit_to_Asia, Positive_X_ray, Smoker)
(TB_or_Lung_Cancer \perp Bronchitis | Lung_Cancer, Visit_to_Asia, Tuberculosis, Smoker)
(TB_or_Lung_Cancer \perp Visit_to_Asia, Bronchitis | Lung_Cancer, Positive_X_ray, Smoker, Tuberculosis)
(TB_or_Lung_Cancer \perp Bronchitis | Visit_to_Asia, Positive_X_ray, Smoker, Tuberculosis)
(TB_or_Lung_Cancer \perp Smoker | Lung_Cancer, Visit_to_Asia, Dispnea, Bronchitis)
(TB_or_Lung_Cancer \perp Smoker | Lung_Cancer, Positive_X_ray, Dispnea, Bronchitis)
(TB_or_Lung_Cancer \perp Visit_to_Asia, Smoker | Lung_Cancer, Tuberculosis, Dispnea, Bronchitis)
(TB_or_Lung_Cancer \perp Visit_to_Asia | Tuberculosis, Positive_X_ray, Dispnea, Bronchitis)
(TB_or_Lung_Cancer \perp Visit_to_Asia | Tuberculosis, Lung_Cancer, Positive_X_ray, Dispnea)
(TB_or_Lung_Cancer \perp Smoker | Lung_Cancer, Visit_to_Asia, Positive_X_ray, Bronchitis)
(TB_or_Lung_Cancer \perp Smoker | Lung_Cancer, Visit_to_Asia, Tuberculosis, Bronchitis)
(TB_or_Lung_Cancer \perp Visit_to_Asia, Smoker | Lung_Cancer, Positive_X_ray, Tuberculosis, Bronchitis)
(TB_or_Lung_Cancer \perp Smoker, Bronchitis | Lung_Cancer, Visit_to_Asia, Positive_X_ray, Tuberculosis)
(TB_or_Lung_Cancer \perp Visit_to_Asia | Lung_Cancer, Smoker, Bronchitis, Tuberculosis, Dispnea)
(TB_or_Lung_Cancer \perp Visit_to_Asia | Positive_X_ray, Smoker, Bronchitis, Tuberculosis, Dispnea)
(TB_or_Lung_Cancer \perp Visit_to_Asia | Positive_X_ray, Lung_Cancer, Smoker, Tuberculosis, Dispnea)
(TB_or_Lung_Cancer \perp Visit_to_Asia | Lung_Cancer, Tuberculosis, Smoker, Bronchitis, Positive_X_ray)
(TB_or_Lung_Cancer \perp Bronchitis | Lung_Cancer, Visit_to_Asia, Tuberculosis, Smoker, Positive_X_ray)
(TB_or_Lung_Cancer \perp Smoker | Lung_Cancer, Visit_to_Asia, Bronchitis, Positive_X_ray, Dispnea)
(TB_or_Lung_Cancer \perp Smoker | Lung_Cancer, Visit_to_Asia, Bronchitis, Tuberculosis, Dispnea)
(TB_or_Lung_Cancer \perp Visit_to_Asia, Smoker | Positive_X_ray, Lung_Cancer, Bronchitis, Tuberculosis, Dispnea)
(TB_or_Lung_Cancer \perp Smoker | Lung_Cancer, Visit_to_Asia, Tuberculosis, Bronchitis, Positive_X_ray)
(TB_or_Lung_Cancer \perp Visit_to_Asia | Lung_Cancer, Tuberculosis, Smoker, Bronchitis, Positive_X_ray, Dispnea)
(Smoker \perp Visit_to_Asia, Tuberculosis)
(Smoker \perp Visit_to_Asia, Tuberculosis | Bronchitis)
(Smoker \perp Visit_to_Asia | Tuberculosis)
(Smoker \perp Visit_to_Asia, Tuberculosis, TB_or_Lung_Cancer, Positive_X_ray | Lung_Cancer)
(Smoker \perp Tuberculosis | Visit_to_Asia)
(Smoker \perp Positive_X_ray | TB_or_Lung_Cancer)
(Smoker \perp Visit_to_Asia | Tuberculosis, Dispnea)
(Smoker \perp Positive_X_ray | TB_or_Lung_Cancer, Dispnea)

(Smoker \perp Visit_to_Asia | Tuberculosis, Bronchitis)
(Smoker \perp Dispnea, Tuberculosis, Visit_to_Asia, Positive_X_ray, TB_or_Lung_Cancer | Lung_Cancer, Bronchitis)
(Smoker \perp Tuberculosis | Visit_to_Asia, Bronchitis)
(Smoker \perp Positive_X_ray, Dispnea | TB_or_Lung_Cancer, Bronchitis)
(Smoker \perp Visit_to_Asia, Positive_X_ray, TB_or_Lung_Cancer | Lung_Cancer, Tuberculosis)
(Smoker \perp Visit_to_Asia | Positive_X_ray, Tuberculosis)
(Smoker \perp Visit_to_Asia, Positive_X_ray | TB_or_Lung_Cancer, Tuberculosis)
(Smoker \perp TB_or_Lung_Cancer, Tuberculosis, Positive_X_ray | Lung_Cancer, Visit_to_Asia)
(Smoker \perp Visit_to_Asia, Tuberculosis, TB_or_Lung_Cancer | Lung_Cancer, Positive_X_ray)
(Smoker \perp Visit_to_Asia, Tuberculosis, Positive_X_ray | Lung_Cancer, TB_or_Lung_Cancer)
(Smoker \perp Positive_X_ray | Visit_to_Asia, TB_or_Lung_Cancer)
(Smoker \perp Visit_to_Asia | Tuberculosis, Dispnea, Bronchitis)
(Smoker \perp Visit_to_Asia, Tuberculosis, TB_or_Lung_Cancer, Positive_X_ray | Lung_Cancer, Dispnea, Bronchitis)
(Smoker \perp Positive_X_ray | TB_or_Lung_Cancer, Dispnea, Bronchitis)
(Smoker \perp Visit_to_Asia | Lung_Cancer, Tuberculosis, Dispnea)
(Smoker \perp Visit_to_Asia | Positive_X_ray, Tuberculosis, Dispnea)
(Smoker \perp Visit_to_Asia, Positive_X_ray | TB_or_Lung_Cancer, Tuberculosis, Dispnea)
(Smoker \perp Visit_to_Asia, Positive_X_ray, Tuberculosis | Lung_Cancer, TB_or_Lung_Cancer, Dispnea)
(Smoker \perp Positive_X_ray | Visit_to_Asia, TB_or_Lung_Cancer, Dispnea)
(Smoker \perp Dispnea, Visit_to_Asia, Positive_X_ray, TB_or_Lung_Cancer | Lung_Cancer, Tuberculosis, Bronchitis)
(Smoker \perp Visit_to_Asia | Positive_X_ray, Tuberculosis, Bronchitis)
(Smoker \perp Visit_to_Asia, Positive_X_ray, Dispnea | TB_or_Lung_Cancer, Tuberculosis, Bronchitis)
(Smoker \perp Dispnea, TB_or_Lung_Cancer, Positive_X_ray, Tuberculosis | Lung_Cancer, Visit_to_Asia, Bronchitis)
(Smoker \perp Dispnea, Visit_to_Asia, Tuberculosis, TB_or_Lung_Cancer | Lung_Cancer, Positive_X_ray, Bronchitis)
(Smoker \perp Visit_to_Asia, Tuberculosis, Dispnea, Positive_X_ray | Lung_Cancer, TB_or_Lung_Cancer, Bronchitis)
(Smoker \perp Positive_X_ray, Dispnea | Visit_to_Asia, TB_or_Lung_Cancer, Bronchitis)
(Smoker \perp Dispnea | TB_or_Lung_Cancer, Positive_X_ray, Bronchitis)
(Smoker \perp TB_or_Lung_Cancer, Positive_X_ray | Lung_Cancer, Visit_to_Asia, Tuberculosis)
(Smoker \perp Visit_to_Asia, TB_or_Lung_Cancer | Lung_Cancer, Positive_X_ray, Tuberculosis)
(Smoker \perp Visit_to_Asia, Positive_X_ray | Lung_Cancer, TB_or_Lung_Cancer, Tuberculosis)
(Smoker \perp Positive_X_ray | Visit_to_Asia, Tuberculosis, TB_or_Lung_Cancer)
(Smoker \perp Visit_to_Asia | Positive_X_ray, Tuberculosis, TB_or_Lung_Cancer)
(Smoker \perp TB_or_Lung_Cancer, Tuberculosis | Lung_Cancer, Visit_to_Asia, Positive_X_ray)
(Smoker \perp Positive_X_ray, Tuberculosis | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer)
(Smoker \perp Visit_to_Asia, Tuberculosis | Lung_Cancer, TB_or_Lung_Cancer, Positive_X_ray)
(Smoker \perp Visit_to_Asia, Positive_X_ray, TB_or_Lung_Cancer | Lung_Cancer, Tuberculosis, Dispnea, Bronchitis)

(Smoker \perp Visit_to_Asia | Positive_X_ray, Tuberculosis, Dispnea, Bronchitis)
(Smoker \perp Visit_to_Asia, Positive_X_ray | TB_or_Lung_Cancer, Tuberculosis, Dispnea, Bronchitis)
(Smoker \perp TB_or_Lung_Cancer, Positive_X_ray, Tuberculosis | Lung_Cancer, Visit_to_Asia, Dispnea, Bronchitis)
(Smoker \perp Visit_to_Asia, Tuberculosis, TB_or_Lung_Cancer | Lung_Cancer, Positive_X_ray, Dispnea, Bronchitis)
(Smoker \perp Visit_to_Asia, Tuberculosis, Positive_X_ray | Lung_Cancer, TB_or_Lung_Cancer, Dispnea, Bronchitis)
(Smoker \perp Positive_X_ray | Visit_to_Asia, TB_or_Lung_Cancer, Dispnea, Bronchitis)
(Smoker \perp Visit_to_Asia | Lung_Cancer, Positive_X_ray, Tuberculosis, Dispnea)
(Smoker \perp Visit_to_Asia, Positive_X_ray | Lung_Cancer, TB_or_Lung_Cancer, Tuberculosis, Dispnea)
(Smoker \perp Positive_X_ray | Visit_to_Asia, Tuberculosis, TB_or_Lung_Cancer, Dispnea)
(Smoker \perp Visit_to_Asia | Positive_X_ray, Tuberculosis, TB_or_Lung_Cancer, Dispnea)
(Smoker \perp Positive_X_ray, Tuberculosis | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Dispnea)
(Smoker \perp Visit_to_Asia, Tuberculosis | Lung_Cancer, TB_or_Lung_Cancer, Positive_X_ray, Dispnea)
(Smoker \perp TB_or_Lung_Cancer, Positive_X_ray, Dispnea | Lung_Cancer, Visit_to_Asia, Tuberculosis, Bronchitis)
(Smoker \perp Dispnea, Visit_to_Asia, TB_or_Lung_Cancer | Lung_Cancer, Positive_X_ray, Tuberculosis, Bronchitis)
(Smoker \perp Visit_to_Asia, Positive_X_ray, Dispnea | Lung_Cancer, TB_or_Lung_Cancer, Tuberculosis, Bronchitis)
(Smoker \perp Positive_X_ray, Dispnea | Visit_to_Asia, Tuberculosis, TB_or_Lung_Cancer, Bronchitis)
(Smoker \perp Visit_to_Asia, Dispnea | Positive_X_ray, Tuberculosis, TB_or_Lung_Cancer, Bronchitis)
(Smoker \perp TB_or_Lung_Cancer, Tuberculosis, Dispnea | Lung_Cancer, Visit_to_Asia, Positive_X_ray, Bronchitis)
(Smoker \perp Dispnea, Positive_X_ray, Tuberculosis | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Bronchitis)
(Smoker \perp Visit_to_Asia, Tuberculosis, Dispnea | Lung_Cancer, TB_or_Lung_Cancer, Positive_X_ray, Bronchitis)
(Smoker \perp Dispnea | Visit_to_Asia, Positive_X_ray, TB_or_Lung_Cancer, Bronchitis)
(Smoker \perp TB_or_Lung_Cancer | Lung_Cancer, Visit_to_Asia, Tuberculosis, Positive_X_ray)
(Smoker \perp Positive_X_ray | Lung_Cancer, Visit_to_Asia, Tuberculosis, TB_or_Lung_Cancer)
(Smoker \perp Visit_to_Asia | Lung_Cancer, Positive_X_ray, Tuberculosis, TB_or_Lung_Cancer)
(Smoker \perp Tuberculosis | Lung_Cancer, Visit_to_Asia, Positive_X_ray, TB_or_Lung_Cancer)
(Smoker \perp TB_or_Lung_Cancer, Positive_X_ray | Lung_Cancer, Visit_to_Asia, Bronchitis, Tuberculosis, Dispnea)
(Smoker \perp Visit_to_Asia, TB_or_Lung_Cancer | Lung_Cancer, Tuberculosis, Bronchitis, Positive_X_ray, Dispnea)
(Smoker \perp Visit_to_Asia, Positive_X_ray | Lung_Cancer, TB_or_Lung_Cancer, Bronchitis, Tuberculosis, Dispnea)
(Smoker \perp Positive_X_ray | Visit_to_Asia, TB_or_Lung_Cancer, Bronchitis, Tuberculosis, Dispnea)
(Smoker \perp Visit_to_Asia | TB_or_Lung_Cancer, Tuberculosis, Bronchitis, Positive_X_ray, Dispnea)

(Smoker \perp TB_or_Lung_Cancer, Tuberculosis | Lung_Cancer, Visit_to_Asia, Bronchitis, Positive_X_ray, Dispnea)
(Smoker \perp Positive_X_ray, Tuberculosis | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Bronchitis, Dispnea)
(Smoker \perp Visit_to_Asia, Tuberculosis | Lung_Cancer, TB_or_Lung_Cancer, Bronchitis, Positive_X_ray, Dispnea)
(Smoker \perp Positive_X_ray | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Tuberculosis, Dispnea)
(Smoker \perp Visit_to_Asia | Lung_Cancer, TB_or_Lung_Cancer, Tuberculosis, Positive_X_ray, Dispnea)
(Smoker \perp Tuberculosis | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Positive_X_ray, Dispnea)
(Smoker \perp TB_or_Lung_Cancer, Dispnea | Lung_Cancer, Visit_to_Asia, Tuberculosis, Bronchitis, Positive_X_ray)
(Smoker \perp Positive_X_ray, Dispnea | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Bronchitis, Tuberculosis)
(Smoker \perp Visit_to_Asia, Dispnea | Lung_Cancer, TB_or_Lung_Cancer, Tuberculosis, Bronchitis, Positive_X_ray)
(Smoker \perp Dispnea | Visit_to_Asia, Tuberculosis, TB_or_Lung_Cancer, Bronchitis, Positive_X_ray)
(Smoker \perp Tuberculosis, Dispnea | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Bronchitis, Positive_X_ray)
(Smoker \perp TB_or_Lung_Cancer | Positive_X_ray, Lung_Cancer, Visit_to_Asia, Bronchitis, Tuberculosis, Dispnea)
(Smoker \perp Positive_X_ray | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Bronchitis, Tuberculosis, Dispnea)
(Smoker \perp Visit_to_Asia | Lung_Cancer, TB_or_Lung_Cancer, Tuberculosis, Bronchitis, Positive_X_ray, Dispnea)
(Smoker \perp Tuberculosis | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Bronchitis, Positive_X_ray, Dispnea)
(Smoker \perp Dispnea | Lung_Cancer, Visit_to_Asia, Tuberculosis, TB_or_Lung_Cancer, Bronchitis, Positive_X_ray)
(Bronchitis \perp Visit_to_Asia, Tuberculosis)
(Bronchitis \perp Tuberculosis, Lung_Cancer, Visit_to_Asia, Positive_X_ray, TB_or_Lung_Cancer | Smoker)
(Bronchitis \perp Visit_to_Asia | Tuberculosis)
(Bronchitis \perp Tuberculosis, Visit_to_Asia, Positive_X_ray, TB_or_Lung_Cancer | Lung_Cancer)
(Bronchitis \perp Tuberculosis | Visit_to_Asia)
(Bronchitis \perp Positive_X_ray | TB_or_Lung_Cancer)
(Bronchitis \perp Lung_Cancer, Visit_to_Asia, Positive_X_ray, TB_or_Lung_Cancer | Tuberculosis, Smoker)
(Bronchitis \perp Tuberculosis, Visit_to_Asia, Positive_X_ray, TB_or_Lung_Cancer | Lung_Cancer, Smoker)
(Bronchitis \perp Lung_Cancer, TB_or_Lung_Cancer, Tuberculosis, Positive_X_ray | Visit_to_Asia, Smoker)
(Bronchitis \perp Lung_Cancer, Visit_to_Asia, Tuberculosis, TB_or_Lung_Cancer | Positive_X_ray, Smoker)
(Bronchitis \perp Lung_Cancer, Visit_to_Asia, Positive_X_ray, Tuberculosis | TB_or_Lung_Cancer, Smoker)
(Bronchitis \perp Visit_to_Asia | Tuberculosis, Dispnea)
(Bronchitis \perp Positive_X_ray | TB_or_Lung_Cancer, Dispnea)
(Bronchitis \perp TB_or_Lung_Cancer, Positive_X_ray, Visit_to_Asia | Lung_Cancer, Tuberculosis)
(Bronchitis \perp Visit_to_Asia | Positive_X_ray, Tuberculosis)
(Bronchitis \perp Visit_to_Asia, Positive_X_ray | TB_or_Lung_Cancer, Tuberculosis)

(Bronchitis \perp TB_or_Lung_Cancer, Tuberculosis, Positive_X_ray $|$ Lung_Cancer, Visit_to_Asia)

(Bronchitis \perp TB_or_Lung_Cancer, Tuberculosis, Visit_to_Asia $|$ Lung_Cancer, Positive_X_ray)

(Bronchitis \perp Visit_to_Asia, Positive_X_ray, Tuberculosis $|$ Lung_Cancer, TB_or_Lung_Cancer)

(Bronchitis \perp Positive_X_ray $|$ Visit_to_Asia, TB_or_Lung_Cancer)

(Bronchitis \perp Visit_to_Asia $|$ Tuberculosis, Smoker, Dispnea)

(Bronchitis \perp Lung_Cancer, Visit_to_Asia, Tuberculosis, Positive_X_ray $|$ TB_or_Lung_Cancer, Smoker, Dispnea)

(Bronchitis \perp Visit_to_Asia, Positive_X_ray, TB_or_Lung_Cancer $|$ Lung_Cancer, Tuberculosis, Smoker)

(Bronchitis \perp Lung_Cancer, TB_or_Lung_Cancer, Positive_X_ray $|$ Visit_to_Asia, Tuberculosis, Smoker)

(Bronchitis \perp Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer $|$ Positive_X_ray, Tuberculosis, Smoker)

(Bronchitis \perp Lung_Cancer, Visit_to_Asia, Positive_X_ray $|$ TB_or_Lung_Cancer, Tuberculosis, Smoker)

(Bronchitis \perp TB_or_Lung_Cancer, Positive_X_ray, Tuberculosis $|$ Lung_Cancer, Visit_to_Asia, Smoker)

(Bronchitis \perp Visit_to_Asia, Tuberculosis, TB_or_Lung_Cancer $|$ Lung_Cancer, Positive_X_ray, Smoker)

(Bronchitis \perp Visit_to_Asia, Tuberculosis, Positive_X_ray $|$ Lung_Cancer, TB_or_Lung_Cancer, Smoker)

(Bronchitis \perp Lung_Cancer, TB_or_Lung_Cancer, Tuberculosis $|$ Visit_to_Asia, Positive_X_ray, Smoker)

(Bronchitis \perp Lung_Cancer, Positive_X_ray, Tuberculosis $|$ Visit_to_Asia, Smoker, TB_or_Lung_Cancer)

(Bronchitis \perp Lung_Cancer, Visit_to_Asia, Tuberculosis $|$ TB_or_Lung_Cancer, Positive_X_ray, Smoker)

(Bronchitis \perp Visit_to_Asia $|$ Lung_Cancer, Tuberculosis, Dispnea)

(Bronchitis \perp Visit_to_Asia $|$ Positive_X_ray, Tuberculosis, Dispnea)

(Bronchitis \perp Visit_to_Asia, Positive_X_ray $|$ TB_or_Lung_Cancer, Tuberculosis, Dispnea)

(Bronchitis \perp Visit_to_Asia, Tuberculosis, Positive_X_ray $|$ Lung_Cancer, TB_or_Lung_Cancer, Dispnea)

(Bronchitis \perp Positive_X_ray $|$ Visit_to_Asia, TB_or_Lung_Cancer, Dispnea)

(Bronchitis \perp TB_or_Lung_Cancer, Positive_X_ray $|$ Lung_Cancer, Visit_to_Asia, Tuberculosis)

(Bronchitis \perp TB_or_Lung_Cancer, Visit_to_Asia $|$ Lung_Cancer, Positive_X_ray, Tuberculosis)

(Bronchitis \perp Visit_to_Asia, Positive_X_ray $|$ Lung_Cancer, TB_or_Lung_Cancer, Tuberculosis)

(Bronchitis \perp Positive_X_ray $|$ Visit_to_Asia, Tuberculosis, TB_or_Lung_Cancer)

(Bronchitis \perp Visit_to_Asia $|$ Positive_X_ray, Tuberculosis, TB_or_Lung_Cancer)

(Bronchitis \perp TB_or_Lung_Cancer, Tuberculosis $|$ Lung_Cancer, Visit_to_Asia, Positive_X_ray)

(Bronchitis \perp Positive_X_ray, Tuberculosis $|$ Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer)

(Bronchitis \perp Visit_to_Asia, Tuberculosis $|$ Lung_Cancer, TB_or_Lung_Cancer, Positive_X_ray)

(Bronchitis \perp Visit_to_Asia $|$ Lung_Cancer, Tuberculosis, Smoker, Dispnea)

(Bronchitis \perp Visit_to_Asia $|$ Positive_X_ray, Tuberculosis, Smoker, Dispnea)

(Bronchitis \perp Lung_Cancer, Visit_to_Asia, Positive_X_ray $|$ TB_or_Lung_Cancer, Tuberculosis, Smoker, Dispnea)

(Bronchitis \perp Visit_to_Asia, Tuberculosis, Positive_X_ray $|$ Lung_Cancer, TB_or_Lung_Cancer)

g_Cancer, Smoker, Dispnea)
(Bronchitis \perp Lung_Cancer, Positive_X_ray, Tuberculosis | TB_or_Lung_Cancer, Visit_to_Asia, Smoker, Dispnea)
(Bronchitis \perp Lung_Cancer, Visit_to_Asia, Tuberculosis | TB_or_Lung_Cancer, Positive_X_ray, Smoker, Dispnea)
(Bronchitis \perp TB_or_Lung_Cancer, Positive_X_ray | Lung_Cancer, Visit_to_Asia, Tuberculosis, Smoker)
(Bronchitis \perp Visit_to_Asia, TB_or_Lung_Cancer | Lung_Cancer, Positive_X_ray, Tuberculosis, Smoker)
(Bronchitis \perp Visit_to_Asia, Positive_X_ray | Lung_Cancer, TB_or_Lung_Cancer, Tuberculosis, Smoker)
(Bronchitis \perp Lung_Cancer, TB_or_Lung_Cancer | Visit_to_Asia, Tuberculosis, Smoker, Positive_X_ray)
(Bronchitis \perp Lung_Cancer, Positive_X_ray | Visit_to_Asia, Tuberculosis, Smoker, TB_or_Lung_Cancer)
(Bronchitis \perp Lung_Cancer, Visit_to_Asia | Positive_X_ray, Tuberculosis, Smoker, TB_or_Lung_Cancer)
(Bronchitis \perp TB_or_Lung_Cancer, Tuberculosis | Lung_Cancer, Visit_to_Asia, Positive_X_ray, Smoker)
(Bronchitis \perp Positive_X_ray, Tuberculosis | Lung_Cancer, Visit_to_Asia, Smoker, TB_or_Lung_Cancer)
(Bronchitis \perp Visit_to_Asia, Tuberculosis | Lung_Cancer, TB_or_Lung_Cancer, Positive_X_ray, Smoker)
(Bronchitis \perp Lung_Cancer, Tuberculosis | Visit_to_Asia, Positive_X_ray, Smoker, TB_or_Lung_Cancer)
(Bronchitis \perp Visit_to_Asia | Lung_Cancer, Positive_X_ray, Tuberculosis, Dispnea)
(Bronchitis \perp Visit_to_Asia, Positive_X_ray | Lung_Cancer, TB_or_Lung_Cancer, Tuberculosis, Dispnea)
(Bronchitis \perp Positive_X_ray | Visit_to_Asia, Tuberculosis, TB_or_Lung_Cancer, Dispnea)
(Bronchitis \perp Visit_to_Asia | Positive_X_ray, Tuberculosis, TB_or_Lung_Cancer, Dispnea)
(Bronchitis \perp Positive_X_ray, Tuberculosis | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Dispnea)
(Bronchitis \perp Visit_to_Asia, Tuberculosis | Lung_Cancer, TB_or_Lung_Cancer, Positive_X_ray, Dispnea)
(Bronchitis \perp TB_or_Lung_Cancer | Lung_Cancer, Visit_to_Asia, Tuberculosis, Positive_X_ray)
(Bronchitis \perp Positive_X_ray | Lung_Cancer, Visit_to_Asia, Tuberculosis, TB_or_Lung_Cancer)
(Bronchitis \perp Visit_to_Asia | Lung_Cancer, Positive_X_ray, Tuberculosis, TB_or_Lung_Cancer)
(Bronchitis \perp Lung_Cancer, Visit_to_Asia, Positive_X_ray, TB_or_Lung_Cancer)
(Bronchitis \perp Visit_to_Asia | Lung_Cancer, Tuberculosis, Smoker, Positive_X_ray, Dispnea)
(Bronchitis \perp Visit_to_Asia, Positive_X_ray | Lung_Cancer, TB_or_Lung_Cancer, Smoker, Tuberculosis, Dispnea)
(Bronchitis \perp Lung_Cancer, Positive_X_ray | TB_or_Lung_Cancer, Visit_to_Asia, Smoker, Tuberculosis, Dispnea)
(Bronchitis \perp Lung_Cancer, Visit_to_Asia | TB_or_Lung_Cancer, Tuberculosis, Smoker, Positive_X_ray, Dispnea)
(Bronchitis \perp Positive_X_ray, Tuberculosis | Lung_Cancer, TB_or_Lung_Cancer, Visit_to_Asia, Smoker, Dispnea)
(Bronchitis \perp Visit_to_Asia, Tuberculosis | Lung_Cancer, TB_or_Lung_Cancer, Smoker, Positive_X_ray, Dispnea)

(Bronchitis \perp Lung_Cancer, Tuberculosis | TB_or_Lung_Cancer, Visit_to_Asia, Smoker, Positive_X_ray, Dispnea)
(Bronchitis \perp TB_or_Lung_Cancer | Positive_X_ray, Lung_Cancer, Visit_to_Asia, Smoker, Tuberculosis)
(Bronchitis \perp Positive_X_ray | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Tuberculosis)
(Bronchitis \perp Visit_to_Asia | Lung_Cancer, TB_or_Lung_Cancer, Tuberculosis, Smoker, Positive_X_ray)
(Bronchitis \perp Lung_Cancer | Positive_X_ray, Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Tuberculosis)
(Bronchitis \perp Tuberculosis | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Positive_X_ray)
(Bronchitis \perp Positive_X_ray | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Tuberculosis, Dispnea)
(Bronchitis \perp Visit_to_Asia | Lung_Cancer, TB_or_Lung_Cancer, Tuberculosis, Positive_X_ray, Dispnea)
(Bronchitis \perp Tuberculosis | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Positive_X_ray, Dispnea)
(Bronchitis \perp Positive_X_ray | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Tuberculosis, Dispnea)
(Bronchitis \perp Visit_to_Asia | Lung_Cancer, TB_or_Lung_Cancer, Tuberculosis, Smoker, Positive_X_ray, Dispnea)
(Bronchitis \perp Lung_Cancer | Positive_X_ray, Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Tuberculosis, Dispnea)
(Bronchitis \perp Tuberculosis | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Positive_X_ray, Dispnea)
(Tuberculosis \perp Lung_Cancer, Smoker, Bronchitis)
(Tuberculosis \perp Lung_Cancer, Bronchitis | Smoker)
(Tuberculosis \perp Lung_Cancer, Smoker | Bronchitis)
(Tuberculosis \perp Smoker, Bronchitis | Lung_Cancer)
(Tuberculosis \perp Lung_Cancer, Smoker, Bronchitis | Visit_to_Asia)
(Tuberculosis \perp Positive_X_ray | TB_or_Lung_Cancer)
(Tuberculosis \perp Lung_Cancer | Smoker, Bronchitis)
(Tuberculosis \perp Bronchitis | Lung_Cancer, Smoker)
(Tuberculosis \perp Lung_Cancer, Bronchitis | Visit_to_Asia, Smoker)
(Tuberculosis \perp Bronchitis | Positive_X_ray, Smoker)
(Tuberculosis \perp Positive_X_ray, Dispnea, Bronchitis | TB_or_Lung_Cancer, Smoker)
(Tuberculosis \perp Positive_X_ray | TB_or_Lung_Cancer, Dispnea)
(Tuberculosis \perp Smoker | Lung_Cancer, Bronchitis)
(Tuberculosis \perp Lung_Cancer, Smoker | Visit_to_Asia, Bronchitis)
(Tuberculosis \perp Positive_X_ray, Dispnea | TB_or_Lung_Cancer, Bronchitis)
(Tuberculosis \perp Smoker, Bronchitis | Lung_Cancer, Visit_to_Asia)
(Tuberculosis \perp Smoker, Bronchitis | Lung_Cancer, Positive_X_ray)
(Tuberculosis \perp Positive_X_ray, Smoker, Dispnea, Bronchitis | Lung_Cancer, TB_or_Lung_Cancer)
(Tuberculosis \perp Positive_X_ray | Visit_to_Asia, TB_or_Lung_Cancer)
(Tuberculosis \perp Positive_X_ray, Bronchitis | TB_or_Lung_Cancer, Smoker, Dispnea)
(Tuberculosis \perp Lung_Cancer | Visit_to_Asia, Smoker, Bronchitis)
(Tuberculosis \perp Positive_X_ray, Dispnea | TB_or_Lung_Cancer, Smoker, Bronchitis)
(Tuberculosis \perp Bronchitis | Lung_Cancer, Visit_to_Asia, Smoker)
(Tuberculosis \perp Bronchitis | Lung_Cancer, Positive_X_ray, Smoker)
(Tuberculosis \perp Positive_X_ray, Dispnea, Bronchitis | Lung_Cancer, TB_or_Lung_Cancer, Smoker)
(Tuberculosis \perp Bronchitis | Visit_to_Asia, Positive_X_ray, Smoker)
(Tuberculosis \perp Positive_X_ray, Dispnea, Bronchitis | Visit_to_Asia, Smoker, TB_or_Lung_Cancer)

(Tuberculosis \perp Dispnea, Bronchitis | TB_or_Lung_Cancer, Positive_X_ray, Smoker)
(Tuberculosis \perp Smoker | Lung_Cancer, Dispnea, Bronchitis)
(Tuberculosis \perp Positive_X_ray | TB_or_Lung_Cancer, Dispnea, Bronchitis)
(Tuberculosis \perp Positive_X_ray, Smoker, Bronchitis | Lung_Cancer, TB_or_Lung_Cancer, Dispnea)
(Tuberculosis \perp Positive_X_ray | Visit_to_Asia, TB_or_Lung_Cancer, Dispnea)
(Tuberculosis \perp Smoker | Lung_Cancer, Visit_to_Asia, Bronchitis)
(Tuberculosis \perp Smoker | Lung_Cancer, Positive_X_ray, Bronchitis)
(Tuberculosis \perp Positive_X_ray, Smoker, Dispnea | Lung_Cancer, TB_or_Lung_Cancer, Bronchitis)
(Tuberculosis \perp Positive_X_ray, Dispnea | Visit_to_Asia, TB_or_Lung_Cancer, Bronchitis)
(Tuberculosis \perp Dispnea | TB_or_Lung_Cancer, Positive_X_ray, Bronchitis)
(Tuberculosis \perp Smoker, Bronchitis | Lung_Cancer, Visit_to_Asia, Positive_X_ray)
(Tuberculosis \perp Positive_X_ray, Smoker, Dispnea, Bronchitis | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer)
(Tuberculosis \perp Smoker, Dispnea, Bronchitis | Lung_Cancer, TB_or_Lung_Cancer, Positive_X_ray)
(Tuberculosis \perp Positive_X_ray | TB_or_Lung_Cancer, Smoker, Dispnea, Bronchitis)
(Tuberculosis \perp Positive_X_ray, Bronchitis | Lung_Cancer, TB_or_Lung_Cancer, Smoker, Dispnea)
(Tuberculosis \perp Positive_X_ray, Bronchitis | TB_or_Lung_Cancer, Visit_to_Asia, Smoker, Dispnea)
(Tuberculosis \perp Bronchitis | TB_or_Lung_Cancer, Positive_X_ray, Smoker, Dispnea)
(Tuberculosis \perp Positive_X_ray, Dispnea | Lung_Cancer, TB_or_Lung_Cancer, Smoker, Bronchitis)
(Tuberculosis \perp Positive_X_ray, Dispnea | Visit_to_Asia, Smoker, TB_or_Lung_Cancer, Bronchitis)
(Tuberculosis \perp Dispnea | TB_or_Lung_Cancer, Positive_X_ray, Smoker, Bronchitis)
(Tuberculosis \perp Bronchitis | Lung_Cancer, Visit_to_Asia, Positive_X_ray, Smoker)
(Tuberculosis \perp Positive_X_ray, Dispnea, Bronchitis | Lung_Cancer, Visit_to_Asia, Smoker, TB_or_Lung_Cancer)
(Tuberculosis \perp Dispnea, Bronchitis | Lung_Cancer, TB_or_Lung_Cancer, Positive_X_ray, Smoker)
(Tuberculosis \perp Dispnea, Bronchitis | Visit_to_Asia, Positive_X_ray, Smoker, TB_or_Lung_Cancer)
(Tuberculosis \perp Smoker | Lung_Cancer, Visit_to_Asia, Dispnea, Bronchitis)
(Tuberculosis \perp Smoker | Lung_Cancer, Positive_X_ray, Dispnea, Bronchitis)
(Tuberculosis \perp Positive_X_ray, Smoker | Lung_Cancer, TB_or_Lung_Cancer, Dispnea, Bronchitis)
(Tuberculosis \perp Positive_X_ray | Visit_to_Asia, TB_or_Lung_Cancer, Dispnea, Bronchitis)
(Tuberculosis \perp Positive_X_ray, Smoker, Bronchitis | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Dispnea)
(Tuberculosis \perp Smoker, Bronchitis | Lung_Cancer, TB_or_Lung_Cancer, Positive_X_ray, Dispnea)
(Tuberculosis \perp Smoker | Lung_Cancer, Visit_to_Asia, Positive_X_ray, Bronchitis)
(Tuberculosis \perp Positive_X_ray, Smoker, Dispnea | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Bronchitis)
(Tuberculosis \perp Smoker, Dispnea | Lung_Cancer, TB_or_Lung_Cancer, Positive_X_ray, Bronchitis)
(Tuberculosis \perp Dispnea | Visit_to_Asia, Positive_X_ray, TB_or_Lung_Cancer, Bronchitis)
(Tuberculosis \perp Smoker, Bronchitis | Lung_Cancer, TB_or_Lung_Cancer, Positive_X_ray, Dispnea)

s, Dispnea)
(Tuberculosis \perp Positive_X_ray | TB_or_Lung_Cancer, Visit_to_Asia, Smoker, Bronchitis, Dispnea)
(Tuberculosis \perp Positive_X_ray, Bronchitis | Lung_Cancer, TB_or_Lung_Cancer, Visit_to_Asia, Smoker, Dispnea)
(Tuberculosis \perp Bronchitis | Lung_Cancer, TB_or_Lung_Cancer, Smoker, Positive_X_ray, Dispnea)
(Tuberculosis \perp Bronchitis | TB_or_Lung_Cancer, Visit_to_Asia, Smoker, Positive_X_ray, Dispnea)
(Tuberculosis \perp Positive_X_ray, Dispnea | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Bronchitis)
(Tuberculosis \perp Dispnea | Lung_Cancer, TB_or_Lung_Cancer, Smoker, Bronchitis, Positive_X_ray)
(Tuberculosis \perp Dispnea | Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Bronchitis, Positive_X_ray)
(Tuberculosis \perp Dispnea, Bronchitis | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Positive_X_ray)
(Tuberculosis \perp Smoker | Lung_Cancer, Visit_to_Asia, Bronchitis, Positive_X_ray, Dispnea)
(Tuberculosis \perp Positive_X_ray, Smoker | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Bronchitis, Dispnea)
(Tuberculosis \perp Smoker | Lung_Cancer, TB_or_Lung_Cancer, Bronchitis, Positive_X_ray, Dispnea)
(Tuberculosis \perp Smoker, Bronchitis | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Positive_X_ray, Dispnea)
(Tuberculosis \perp Smoker, Dispnea | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Bronchitis, Positive_X_ray)
(Tuberculosis \perp Positive_X_ray | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Bronchitis, Dispnea)
(Tuberculosis \perp Bronchitis | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Positive_X_ray, Dispnea)
(Tuberculosis \perp Dispnea | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Bronchitis, Positive_X_ray)
(Tuberculosis \perp Smoker | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Bronchitis, Positive_X_ray, Dispnea)
(Tuberculosis \perp Smoker, Bronchitis | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Positive_X_ray, Dispnea)
(Dispnea \perp Visit_to_Asia | Tuberculosis)
(Dispnea \perp Positive_X_ray | TB_or_Lung_Cancer)
(Dispnea \perp Visit_to_Asia | Tuberculosis, Smoker)
(Dispnea \perp Lung_Cancer, Visit_to_Asia, Tuberculosis, Positive_X_ray | TB_or_Lung_Cancer, Smoker)
(Dispnea \perp Visit_to_Asia | Tuberculosis, Bronchitis)
(Dispnea \perp Smoker | Lung_Cancer, Bronchitis)
(Dispnea \perp Positive_X_ray, Smoker, Lung_Cancer, Visit_to_Asia, Tuberculosis | TB_or_Lung_Cancer, Bronchitis)
(Dispnea \perp Visit_to_Asia | Lung_Cancer, Tuberculosis)
(Dispnea \perp Visit_to_Asia | Positive_X_ray, Tuberculosis)
(Dispnea \perp Visit_to_Asia, Positive_X_ray | TB_or_Lung_Cancer, Tuberculosis)
(Dispnea \perp Visit_to_Asia, Tuberculosis, Positive_X_ray | Lung_Cancer, TB_or_Lung_Cancer)
(Dispnea \perp Positive_X_ray | Visit_to_Asia, TB_or_Lung_Cancer)
(Dispnea \perp Visit_to_Asia | Tuberculosis, Smoker, Bronchitis)
(Dispnea \perp Lung_Cancer, Visit_to_Asia, Tuberculosis, Positive_X_ray | TB_or_Lung_Cancer, Smoker, Bronchitis)
(Dispnea \perp Visit_to_Asia | Lung_Cancer, Tuberculosis, Smoker)
(Dispnea \perp Visit_to_Asia | Positive_X_ray, Tuberculosis, Smoker)
(Dispnea \perp Lung_Cancer, Visit_to_Asia, Positive_X_ray | TB_or_Lung_Cancer, Tubercu

losis, Smoker)
(Dispnea \perp Visit_to_Asia, Positive_X_ray, Tuberculosis | Lung_Cancer, TB_or_Lung_Cancer, Smoker)
(Dispnea \perp Lung_Cancer, Positive_X_ray, Tuberculosis | Visit_to_Asia, Smoker, TB_or_Lung_Cancer)
(Dispnea \perp Lung_Cancer, Visit_to_Asia, Tuberculosis | TB_or_Lung_Cancer, Positive_X_ray, Smoker)
(Dispnea \perp Visit_to_Asia, Smoker | Lung_Cancer, Tuberculosis, Bronchitis)
(Dispnea \perp Visit_to_Asia | Positive_X_ray, Tuberculosis, Bronchitis)
(Dispnea \perp Lung_Cancer, Visit_to_Asia, Positive_X_ray, Smoker | TB_or_Lung_Cancer, Tuberculosis, Bronchitis)
(Dispnea \perp Smoker | Lung_Cancer, Visit_to_Asia, Bronchitis)
(Dispnea \perp Smoker | Lung_Cancer, Positive_X_ray, Bronchitis)
(Dispnea \perp Visit_to_Asia, Tuberculosis, Smoker, Positive_X_ray | Lung_Cancer, TB_or_Lung_Cancer, Bronchitis)
(Dispnea \perp Lung_Cancer, Positive_X_ray, Smoker, Tuberculosis | Visit_to_Asia, TB_or_Lung_Cancer, Bronchitis)
(Dispnea \perp Lung_Cancer, Visit_to_Asia, Tuberculosis, Smoker | TB_or_Lung_Cancer, Positive_X_ray, Bronchitis)
(Dispnea \perp Visit_to_Asia | Lung_Cancer, Positive_X_ray, Tuberculosis)
(Dispnea \perp Visit_to_Asia, Positive_X_ray | Lung_Cancer, TB_or_Lung_Cancer, Tuberculosis)
(Dispnea \perp Positive_X_ray | Visit_to_Asia, Tuberculosis, TB_or_Lung_Cancer)
(Dispnea \perp Visit_to_Asia | Positive_X_ray, Tuberculosis, TB_or_Lung_Cancer)
(Dispnea \perp Positive_X_ray, Tuberculosis | Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer)
(Dispnea \perp Visit_to_Asia, Tuberculosis | Lung_Cancer, TB_or_Lung_Cancer, Positive_X_ray)
(Dispnea \perp Visit_to_Asia | Lung_Cancer, Tuberculosis, Smoker, Bronchitis)
(Dispnea \perp Visit_to_Asia | Positive_X_ray, Tuberculosis, Smoker, Bronchitis)
(Dispnea \perp Lung_Cancer, Visit_to_Asia, Positive_X_ray | TB_or_Lung_Cancer, Tuberculosis, Smoker, Bronchitis)
(Dispnea \perp Visit_to_Asia, Tuberculosis, Positive_X_ray | Lung_Cancer, TB_or_Lung_Cancer, Smoker, Bronchitis)
(Dispnea \perp Lung_Cancer, Positive_X_ray, Tuberculosis | Visit_to_Asia, Smoker, TB_or_Lung_Cancer, Bronchitis)
(Dispnea \perp Lung_Cancer, Visit_to_Asia, Tuberculosis | TB_or_Lung_Cancer, Positive_X_ray, Smoker, Bronchitis)
(Dispnea \perp Visit_to_Asia | Lung_Cancer, Positive_X_ray, Tuberculosis, Smoker)
(Dispnea \perp Visit_to_Asia, Positive_X_ray | Lung_Cancer, TB_or_Lung_Cancer, Tuberculosis, Smoker)
(Dispnea \perp Lung_Cancer, Positive_X_ray | Visit_to_Asia, Tuberculosis, Smoker, TB_or_Lung_Cancer)
(Dispnea \perp Lung_Cancer, Visit_to_Asia | Positive_X_ray, Tuberculosis, Smoker, TB_or_Lung_Cancer)
(Dispnea \perp Positive_X_ray, Tuberculosis | Lung_Cancer, Visit_to_Asia, Smoker, TB_or_Lung_Cancer)
(Dispnea \perp Visit_to_Asia, Tuberculosis | Lung_Cancer, TB_or_Lung_Cancer, Positive_X_ray, Smoker)
(Dispnea \perp Lung_Cancer, Tuberculosis | Visit_to_Asia, Positive_X_ray, Smoker, TB_or_Lung_Cancer)
(Dispnea \perp Smoker | Lung_Cancer, Visit_to_Asia, Tuberculosis, Bronchitis)
(Dispnea \perp Visit_to_Asia, Smoker | Lung_Cancer, Positive_X_ray, Tuberculosis, Bronchitis)
(Dispnea \perp Visit_to_Asia, Positive_X_ray, Smoker | Lung_Cancer, TB_or_Lung_Cancer, Tuberculosis, Bronchitis)

(Dispnea \perp Lung_Cancer, Positive_X_ray, Smoker $|$ Visit_to_Asia, Tuberculosis, TB_or_Lung_Cancer, Bronchitis)
(Dispnea \perp Lung_Cancer, Visit_to_Asia, Smoker $|$ Positive_X_ray, Tuberculosis, TB_or_Lung_Cancer, Bronchitis)
(Dispnea \perp Smoker $|$ Lung_Cancer, Visit_to_Asia, Positive_X_ray, Bronchitis)
(Dispnea \perp Positive_X_ray, Smoker, Tuberculosis $|$ Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Bronchitis)
(Dispnea \perp Visit_to_Asia, Tuberculosis, Smoker $|$ Lung_Cancer, TB_or_Lung_Cancer, Positive_X_ray, Bronchitis)
(Dispnea \perp Lung_Cancer, Tuberculosis, Smoker $|$ Visit_to_Asia, Positive_X_ray, TB_or_Lung_Cancer, Bronchitis)
(Dispnea \perp Positive_X_ray $|$ Lung_Cancer, Visit_to_Asia, Tuberculosis, TB_or_Lung_Cancer)
(Dispnea \perp Visit_to_Asia $|$ Lung_Cancer, Positive_X_ray, Tuberculosis, TB_or_Lung_Cancer)
(Dispnea \perp Tuberculosis $|$ Lung_Cancer, Visit_to_Asia, Positive_X_ray, TB_or_Lung_Cancer)
(Dispnea \perp Visit_to_Asia $|$ Lung_Cancer, Tuberculosis, Smoker, Bronchitis, Positive_X_ray)
(Dispnea \perp Visit_to_Asia, Positive_X_ray $|$ Lung_Cancer, TB_or_Lung_Cancer, Smoker, Bronchitis, Tuberculosis)
(Dispnea \perp Lung_Cancer, Positive_X_ray $|$ Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Bronchitis, Tuberculosis)
(Dispnea \perp Lung_Cancer, Visit_to_Asia $|$ TB_or_Lung_Cancer, Tuberculosis, Smoker, Bronchitis, Positive_X_ray)
(Dispnea \perp Positive_X_ray, Tuberculosis $|$ Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Bronchitis)
(Dispnea \perp Visit_to_Asia, Tuberculosis $|$ Lung_Cancer, TB_or_Lung_Cancer, Smoker, Bronchitis, Positive_X_ray)
(Dispnea \perp Lung_Cancer, Tuberculosis $|$ Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Bronchitis, Positive_X_ray)
(Dispnea \perp Positive_X_ray $|$ Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Tuberculosis)
(Dispnea \perp Visit_to_Asia $|$ Lung_Cancer, TB_or_Lung_Cancer, Tuberculosis, Smoker, Positive_X_ray)
(Dispnea \perp Lung_Cancer $|$ Positive_X_ray, Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Tuberculosis)
(Dispnea \perp Tuberculosis $|$ Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Positive_X_ray)
(Dispnea \perp Smoker $|$ Lung_Cancer, Visit_to_Asia, Tuberculosis, Bronchitis, Positive_X_ray)
(Dispnea \perp Positive_X_ray, Smoker $|$ Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Bronchitis, Tuberculosis)
(Dispnea \perp Visit_to_Asia, Smoker $|$ Lung_Cancer, TB_or_Lung_Cancer, Tuberculosis, Bronchitis, Positive_X_ray)
(Dispnea \perp Lung_Cancer, Smoker $|$ Visit_to_Asia, Tuberculosis, TB_or_Lung_Cancer, Bronchitis, Positive_X_ray)
(Dispnea \perp Tuberculosis, Smoker $|$ Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Bronchitis, Positive_X_ray)
(Dispnea \perp Positive_X_ray $|$ Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Bronchitis, Tuberculosis)
(Dispnea \perp Visit_to_Asia $|$ Lung_Cancer, TB_or_Lung_Cancer, Tuberculosis, Smoker, Bronchitis, Positive_X_ray)
(Dispnea \perp Lung_Cancer $|$ Visit_to_Asia, Tuberculosis, TB_or_Lung_Cancer, Smoker, Bronchitis, Positive_X_ray)
(Dispnea \perp Tuberculosis $|$ Lung_Cancer, Visit_to_Asia, TB_or_Lung_Cancer, Smoker, Bronchitis, Positive_X_ray)

```
ronchitis, Positive_X_ray)
(Dispnea ⊥ Smoker | Lung_Cancer, Visit_to_Asia, Tuberculosis, TB_or_Lung_Cancer, B
ronchitis, Positive_X_ray)
```

Q1

In [57]: `print(cpd_Tuberculosis)`

Visit_to_Asia	Visit_to_Asia(0)	Visit_to_Asia(1)
Tuberculosis(0)	0.99	0.95
Tuberculosis(1)	0.01	0.05

In [58]: `print(cpd_Dispnea)`

TB_or_Lung_Cancer	TB_or_Lung_Cancer(0)	TB_or_Lung_Cancer(0)	TB_or_Lung_Cancer(0)	TB_or_Lung_Cancer(1)	TB_or_Lung_Cancer(1)
Bronchitis	Bronchitis(0)	Bronchitis(1)	Bronchitis(0)	Bronchitis(1)	Bronchitis(1)
Dispnea(0)	0.9	0.2	0.3		
Dispnea(1)	0.1	0.8	0.7		
	0.1	0.9			

In [79]: `'''
Income
Deposit
Housing
Payment
Security
'''`

```
q1mdl = BayesianNetwork(
    [
        ("Income", "Deposit"),
        ("Income", "Payment"),
        ("Payment", "Security"),
        ("Deposit", "Payment"),
        ("Housing", "Security")
    ]
)

from pgmpy.factors.discrete import TabularCPD
```

```
cpd_Income = TabularCPD(  
    variable="Income", variable_card=2, values=[[0.3], [0.7]]  
)  
cpd_Housing = TabularCPD(  
    variable="Housing", variable_card=2, values=[[0.35], [0.65]]  
)  
cpd_Deposit = TabularCPD(  
    variable="Deposit",  
    variable_card=2,  
    values=[[0.4, 0.9], [0.6, 0.1]],  
    evidence=["Income"],  
    evidence_card=[2],  
)  
cpd_Payment = TabularCPD(  
    variable="Payment",  
    variable_card=2,  
    values=[[0.4, 0.55, 0.5, 0.95], [0.6, 0.45, 0.5, 0.05]],  
    evidence=["Income", "Deposit"],  
    evidence_card=[2, 2],  
)  
cpd_Security = TabularCPD(  
    variable="Security",  
    variable_card=2,  
    values=[[0.69, 0.25, 0.5, 0.99], [0.31, 0.75, 0.5, 0.01]],  
    evidence=["Payment", "Housing"],  
    evidence_card=[2, 2],  
)  
  
q1mdl.add_cpd(cpd_Income, cpd_Housing, cpd_Deposit, cpd_Payment, cpd_Security)
```

In [80]: `q1mdl.check_model()`

Out[80]: `True`

In [88]: `q1inf = VariableElimination(q1mdl)`

In [81]: `print(cpd_Deposit)`

Income	Income(0)	Income(1)
Deposit(0)	0.4	0.9
Deposit(1)	0.6	0.1

In [82]: `print(cpd_Payment)`

Income	Income(0)	Income(0)	Income(1)	Income(1)
Deposit	Deposit(0)	Deposit(1)	Deposit(0)	Deposit(1)
Payment(0)	0.4	0.55	0.5	0.95
Payment(1)	0.6	0.45	0.5	0.05

```
In [83]: print(cpd_Security)
```

Payment	Payment(0)	Payment(0)	Payment(1)	Payment(1)
Housing	Housing(0)	Housing(1)	Housing(0)	Housing(1)
Security(0)	0.69	0.25	0.5	0.99
Security(1)	0.31	0.75	0.5	0.01

Q1 (I):

```
In [85]: q1mdl.get_independencies()
```

```
Out[85]: (Payment ⊥ Housing)
          (Payment ⊥ Housing | Income)
          (Payment ⊥ Housing | Deposit)
          (Payment ⊥ Housing | Income, Deposit)
          (Security ⊥ Income, Deposit | Payment)
          (Security ⊥ Deposit | Payment, Income)
          (Security ⊥ Income, Deposit | Payment, Housing)
          (Security ⊥ Income | Payment, Deposits)
          (Security ⊥ Deposit | Payment, Income, Housing)
          (Security ⊥ Income | Payment, Housing, Deposit)
          (Deposit ⊥ Housing)
          (Deposit ⊥ Security, Housing | Payment)
          (Deposit ⊥ Housing | Income)
          (Deposit ⊥ Security, Housing | Payment, Income)
          (Deposit ⊥ Housing | Payment, Security)
          (Deposit ⊥ Security | Payment, Housing)
          (Deposit ⊥ Housing | Payment, Income, Security)
          (Deposit ⊥ Security | Payment, Income, Housing)
          (Income ⊥ Housing)
          (Income ⊥ Security, Housing | Payment)
          (Income ⊥ Housing | Deposit)
          (Income ⊥ Housing | Payment, Security)
          (Income ⊥ Security | Payment, Housing)
          (Income ⊥ Security, Housing | Payment, Deposit)
          (Income ⊥ Housing | Payment, Security, Deposit)
          (Income ⊥ Security | Payment, Housing, Deposit)
          (Housing ⊥ Payment, Income, Deposit)
          (Housing ⊥ Income, Deposit | Payment)
          (Housing ⊥ Payment, Deposit | Income)
          (Housing ⊥ Payment, Income | Deposit)
          (Housing ⊥ Deposit | Payment, Income)
          (Housing ⊥ Income, Deposit | Payment, Security)
          (Housing ⊥ Income | Payment, Deposit)
          (Housing ⊥ Payment | Income, Deposit)
          (Housing ⊥ Deposit | Payment, Income, Security)
          (Housing ⊥ Income | Payment, Security, Deposit)
```

```
In [89]: payinf = q1inf.query(variables=['Payment'])
print(payinf)
```

Payment	phi(Payment)
Payment(0)	0.5285
Payment(1)	0.4715

Q1 (III) Ans: 0.5285

```
In [90]: payinf = q1inf.query(variables=['Payment'], evidence = {'Income':0})
print(payinf)
```

Payment	phi(Payment)
Payment(0)	0.4900
Payment(1)	0.5100

Q1 (IV) Ans: 0.51

```
In [91]: payinf = q1inf.query(variables=['Payment'], evidence = {'Income':0, 'Deposit':1})
print(payinf)
```

Payment	phi(Payment)
Payment(0)	0.5500
Payment(1)	0.4500

Q1 (V) Ans: 0.45

```
In [92]: payinf = q1inf.query(variables=['Payment'], evidence = {'Income':1, 'Security':0})
print(payinf)
```

Payment	phi(Payment)
Payment(0)	0.3716
Payment(1)	0.6284

Q1 (VI) Ans: 0.6284

```
In [ ]:
```