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ML Lab test – 1

Program:

```
import numpy as np
import pandas as pd
import csv
from pgmpy.estimators import MaximumLikelihoodEstimator
from pgmpy.models import BayesianModel
from pgmpy.inference import VariableElimination
#read the dataset
passExam = pd.read_csv('/content/PassExam.csv')
passExam = passExam.replace('?',np.nan)
#display the data
print('Sample instances from the dataset are given below')
print(passExam.head())
#display the Attributes names and datatyes
print('\n Attributes and datatypes')
print(passExam.dtypes)
#Creat Model- Bayesian Network
model = BayesianModel([('smart','prepared'),('study','prepared'),(
'smart','passExam'),('prepared','passExam'),('fair','passExam')])
```

```
#Learning CPDs using Maximum Likelihood Estimators
print('\n Learning CPD using Maximum likelihood estimators')
model.fit(passExam,estimator=MaximumLikelihoodEstimator)
# Inferencing with Bayesian Network
print('\n Inferencing with Bayesian Network:')
PassExam_infer = VariableElimination(model)
#computing the Probability that a student studied given that he passed the exam
print('\n 1.Probability that a student studied given that he passed the exam')
q=PassExam_infer.query(variables=['study'],evidence={'passExam':1})
print(q)
```

CSV file: PassExam.csv

	A	B	C	D	E	F
1	smart	study	prepared	fair	passExam	
2	0	0	0	0	0	
3	0	1	1	0	0	
4	1	0	0	0	0	
5	1	1	1	0	0	
6	0	0	0	1	0	
7	0	1	1	1	1	
8	1	0	0	1	1	
9	1	1	1	1	1	
10						
11						

1 -> smart, studied, prepared, fair, failed

0 -> not smart, not studied, not prepared, not fair, failed