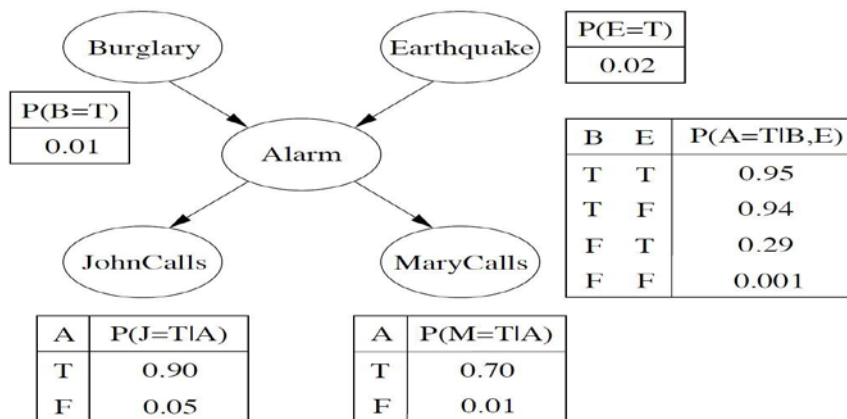Worksheet: Probabilistic Graphical Models (PGMs)

1. Draw a PGD to model the following scenario. Consider the problem of a robot slipping while walking in a street searching for a specific object. The slip is based on the ground being wet and there is two factors cause the ground to be wet: having rain and/or washing cars in the street. Note: You will need to think about what RVs are needed.

2. Write the factorised joint distribution according to the designed graph.

3. How many parameters in the CPTs? assume each variable is boolean (can take on one of two possible values)

4. Now repeat {2, 3} for the following two graphs.
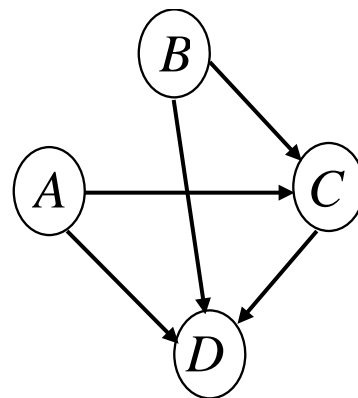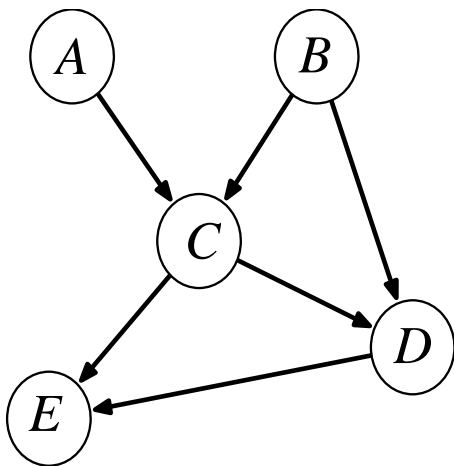
5. Draw a graph for the full chain rule expansion over 5 vars. How many free parameters? assume each variable is boolean (can take on one of two possible values). Write the joint probability using chain rule for this graph?

6. Given the following graph:

B	E	P(A=T|B,E)
T	T	0.95
T	F	0.94
F	T	0.29
F	F	0.001

P(E=T)
0.02

P(B=T)
0.01

A	P(J=T|A)
T	0.90
F	0.05

A	P(M=T|A)
T	0.70
F	0.01

- Express the *conditional* P(J=T | E=T) using mathematical symbols, and then compute the numerical values using the given CPT values.
- Are Burglary and Earthquake independent? What about when we observe M=T?