CS 6323 PROBLEM SET: PROBABILITY, GRAPH THEORY, NETWORK TOPOLOGY

1. Consider three events: A, B, C.
   - Pr(A) = Pr(B) = Pr(C) = 1/5
   - Pr(A,C) = Pr(B,C) = 1/25, Pr(A,B) = 1/10
   - Pr(A,B,C) = 1/125
     a. Are A, B independent?
     b. Are A, B conditionally independent given C?
2. Consider two binary-valued events, R: It is a rainy day, W: The grass is wet. We have priors for Pr(R)= (0.8,0.2), and a conditional probability table Pr (W|R), as given below. Compute Pr(R|W).

Pr(W|R)	R	¬R
W	0.7	0.4
¬W	0.3	0.6

3. Consider three events: R (rain), W (grass is wet), U (bring umbrella). We have We have priors for Pr(R)= (0.8,0.2), and conditional probability tables for Pr (W|R) and Pr(U|R), as given below.

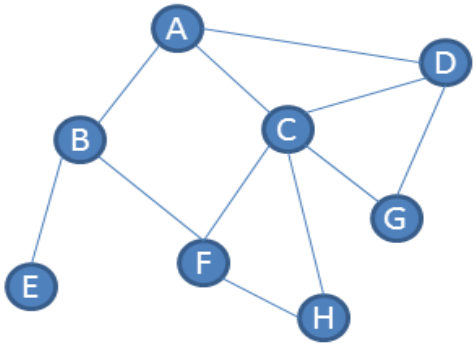
Pr(W|R)	R	¬R
W	0.7	0.4
¬W	0.3	0.6

Pr(U|R)	R	¬R
U	0.9	0.2
¬U	0.1	0.8

   Compute the following:
   a. Pr(W)
   b. Pr(U|W)

4. The **distance** between two vertices in a graph is the number of edges in a shortest path connecting them.

- Compute the mean distance of the graph below.
- Compute the graph diameter, i.e., the greatest distance between any two vertices.


A
D
B
C
G
F
E
H