ECS 170 Homework 3

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1. Consider the figure

   (a) Which of the following (if any) are asserted by the network structure?

      i. $P(B, I, M) = P(B)P(I)P(M)$
      This is not asserted because B, I, M are not independent.

      ii. $P(J|G) = P(J|G, I)$
      This is asserted because J is conditionally independent of I given G.

      iii. $P(M|G, B, I) = P(M|G, B, I, J)$
      This is asserted because J is conditionally indepented of M given G.

   (b) Calculate the value of $P(b, i, m, \neg g, j)$.

$$\begin{aligned} P(b, i, m, \neg g, j) &= P(b)P(i|b, m)P(m)P(\neg g|b, i, m)P(j|\neg g) \\ &= (0.9)(0.9)(0.1)(0.9)(0.0) \\ &= 0.0 \end{aligned}$$

2. Consider the figure.

   (a) Give one example of conditional independence and another of unconditional independence.
   JohnCalls is conditionally independent of **Burglary** given **Alarm**.
   Burglary is unconditinally independent of **Earthquake**.

   (b) Write completely the general expression to calculate
   $P(Burglary, Earthquake, Alarm, JohnCalls, MaryCalls)$
   Abbreviating

Burglary	B
Earthquake	E
Alarm	A
JohnCalls	J
MaryCalls	M

$$P(B, E, A, J, M) = P(B)P(E)P(A|B, E)P(J|A)P(M|A)$$