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| **Bayesian Networks** |

There are many types of reasoning using Bayesian networks. Among them are **diagnostic** and **predictive** reasoning.

1. Which kind of reasoning illustrated by each graph (A), and (B)?
2. How can the Query and Evidence be called in each reasoning type..?
   * In (A): Query:………Cause……….. and Evidence:……………Effect………………………...
   * In (B): Query:………Cause…..…………….. and Evidence:……………Effect………………………

Query

Query

Evidence

Query

Query

Evidence

Query

Direction of reasoning

Direction of reasoning

**(A) Diagnosis (B) Predictive**

To detect the presence of a certain natural resource in the basement floor, a mining company performs tests using two detection instruments A and B. Instrument B is sensitive to the presence of moisture in the soil . The following Bayesian network was developed by the company.

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| **P(R=T)** |
| 0.01 |

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| --- | --- | --- |
| **P(H)** | | |
| **Weak** | **Medium** | **High** |
| 0.1 | 0.5 | 0.4 |

|  |  |  |
| --- | --- | --- |
| **R** | **H** | **P(B=T|R,H)** |
| F | Weak | 0.1 |
| F | Medium | 0.2 |
| F | High | 0.6 |
| T | Weak | 0.9 |
| T | Medium | 0.8 |
| T | High | 0.7 |

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| **R** | **P(A|R)** |
| F | 0.1 |
| T | 0.9 |

1. Calculate the following (First, you MUST show all the required formulas.)
   * Calculate P(R=F) = 0.99 …………………………………………………………………………..…….………………………
   * Calculate P(B=F|R=T,H=Weak)=0.1…………………………………………………………………………………..……
   * Calculate P(R=T|A=T,B=T,H=Weak). ………………………………………………………………………………………

See next page.

