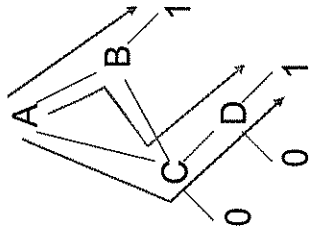


Example

- Consider FT-BDDI:



- Three paths from root (A) to leaf node labeled 1.
- Each path is disjoint by construction, so no subtraction is needed.
- Pr{system failure}
 
$$= \Pr\{A \text{ and } B\} + \Pr\{A \text{ and } (\text{not } B) \text{ and } C \text{ and } D\} + \Pr\{(\text{not } A) \text{ and } C \text{ and } D\}$$

$$= q_A q_B + q_A(1 - q_B) q_C q_D + (1 - q_A) q_C q_D$$

Dr. Xing

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BDD Recursive Algorithm Illustration:  
Top-down:

$$P\{A\} = q_A \cdot P\{B\} + (1 - q_A) \cdot P\{C\}$$

$$P\{B\} = q_B \cdot 1 + (1 - q_B) \cdot P\{C\}$$

$$P\{C\} = q_C \cdot P\{D\} + (1 - q_C) \cdot 0$$

$$= q_C \cdot P\{D\}$$

$$P\{D\} = q_D \cdot 1 + (1 - q_D) \cdot 0 = q_D$$

Return (bottom-up)

$$P\{C\} = q_C \cdot q_D$$

$$P\{B\} = q_B + (1 - q_B) \cdot q_C \cdot q_D$$

$$P\{A\} = q_A \cdot [q_B + (1 - q_B) \cdot q_C \cdot q_D] +$$

$$(1 - q_A) \cdot q_C \cdot q_D$$

$$= q_A q_B + q_A (1 - q_B) q_C q_D + (1 - q_A) q_C q_D$$