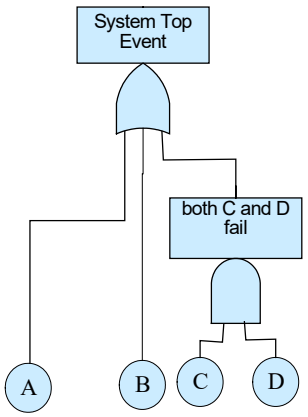


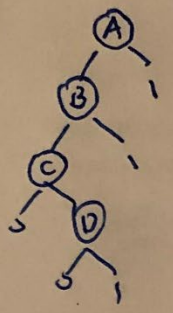
L#13 Extra-Credit Question Solution

For the system in the following fault tree mode, assume the component failure probabilities are: A (0.02), B (0.04), C (0.06), D (0.05).

1) Find the Birnbaum's measure for **component C**

2) Find the diagnostic importance factor (DIF) for **component C**.

Extra-Credit Question



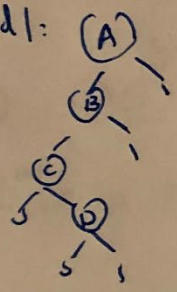
$Usys = q_A + (1-q_A)\,q_B + (1-q_A)(1-q_B)\,q_C\,q_D$

$= 0.062$

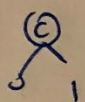
1) $I^{BM}(C) = \frac{\partial Usys}{\partial q_C} = (1-q_A)(1-q_B)\cdot q_D = 0.047$

2) $I^{DIF}(C) = Pr\{C|S\} = \frac{Pr\{SnC\}}{Usys} = \frac{0.006374}{0.062} = 0.1028$

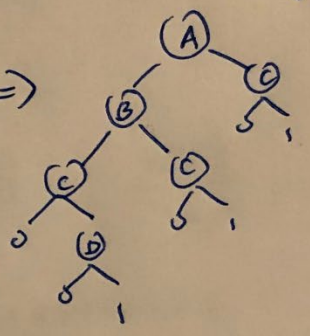
Method 1:



AND



$\Rightarrow$



$Pr\{SnC\}$

$= q_A q_C +$

$(1-q_A) q_B q_C +$

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

$= 0.006374$

Method 2:

$Snc = (A+B+CD)C = AC + BC + CD$

$Pr\{SnC\} = Pr\{AC+BC+CD\}$ I/E

$= Pr\{AC\} + Pr\{BC\} + Pr\{CD\} - Pr\{ABC\} - Pr\{ACD\} - Pr\{BCD\} + Pr\{ABCD\}$

$= 0.006374$