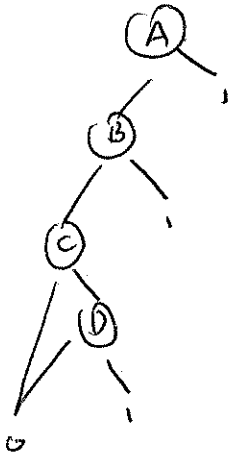
Solution to Hands-on Problem.

BDD:



$$U_{sys} = q_A + (1-q_A)\cdot q_B + (1-q_A)(1-q_B)\cdot q_C \cdot q_D$$

$$= 0.0620224$$

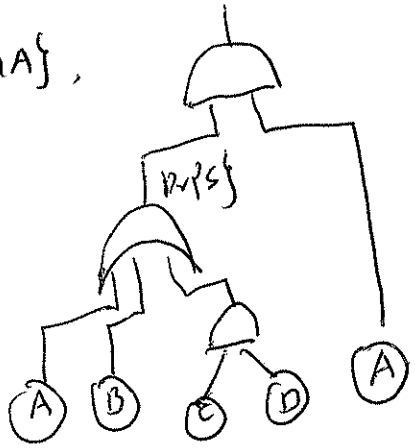
① $$I^{BM}(A) = \frac{\partial U_{sys}}{\partial q_A} = 1 - q_B - (1-q_B)\cdot q_C \cdot q_D = 1 - 0.04 - 0.96 \times 0.06 \times 0.05$$

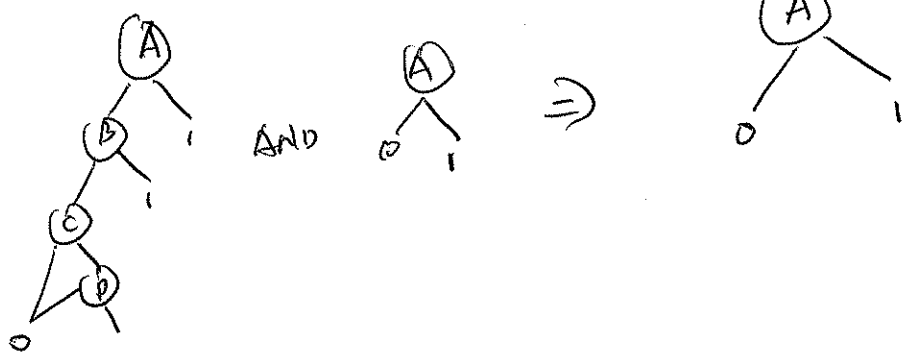
$$= 0.95712$$

② $$I^{DIF}(A) = \frac{q_A}{U_{sys}} \cdot I^{BM}(A) = \frac{0.02}{0.0620224} * 0.95712 = 0.308637$$

③ $$I^{DIF}(A) = Pr\{A \mid S\} = \frac{Pr\{S \cap A\}}{Pr\{S\}} = \frac{Pr\{S \cap A\}}{U_{sys}} = \frac{0.02}{0.0620224} = 0.322$$

For computing $Pr\{S \cap A\}$,





$$\Rightarrow Pr\{S \cap A\} = Pr\{A\} = 0.02$$

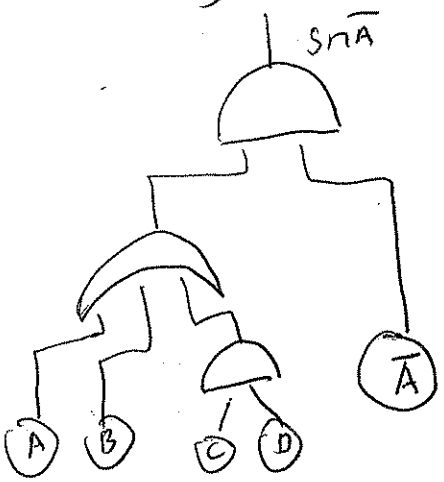
(4) $$I^{cp}(A) = Pr\{S|A\} = \frac{Pr\{S \cap A\}}{Pr\{A\}} = \frac{0.02}{0.02} = 1$$

(5) $$I^{IP}(A) = I^{BM}(A) * q_A = 0.95712 \times 0.02 = 0.01914$$

(6) $$I^{RAW}(A) = \frac{I^{cp}(A)}{U_{sys}} = \frac{1}{0.062224} = 16.1232$$

(7) $$I^{RRW}(A) = \frac{U_{sys}(1-q_A)}{Pr\{S \cap \bar{A}\}} = \frac{0.062224 * 0.98}{Pr\{S \cap \bar{A}\}} = \frac{0.062224 \times 0.98}{0.042224} = 1.44642$$

For computing $Pr\{S \cap \bar{A}\}$



$$\bar{A} \cap S = (A + B + CD) * \bar{A}$$

$$= 0 + \bar{A}B + \bar{A}CD$$

$$Pr\{S \cap \bar{A}\} = Pr\{\bar{A}B\} + Pr\{\bar{A}CD\} - Pr\{\bar{A}BCD\}$$

$$= 0.98 * 0.04 + 0.98 \times 0.05 \times 0.06 - 0.98 \times 0.04 \times 0.05 \times 0.06$$

$$= 0.042224$$