MATH-505A: Assignment

Due on Friday, August 29, 2014

10:30am

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Exercise # 1.2

(3)

At the start of the tournament we have 2^n players to begin with. At each round there will be **one** winner emerging from each of the pairs while the other gets 'knocked out'. One possible configuration for the first round of the tournament would be: $Player_1$ v/s $Player_2$; $Player_3$ v/s $Player_4$;...;, $Player_(2^n - 1)$ v/s $Player(2^n)$. At the end of first round, there are exactly $\frac{2^n}{2} = 2^{n-1}$ winners and an equal number of knocked out players.
At round 1 the set of $2^n - 1$ pairs can be represented as :$P_1, P_2, P_3, P_4, .., P_{2^n-1}$. The total number of such pairs is 2^n divided by 2 since each pair has 2 players. The outcome of first round can generate two values for each of these pairs depending on who amongst the two players is the winner. For e.g. $Player_1$ can win while playing in P_1 or $Player_2$ can, Thus total number of such configurations for the round 1 would be $2 * 2 * 2 * ... * (2^n - 1)$ times which is equal to $2^{2^{n-}}$. Now at round 2 we would have 2^{n-2} pairs of players to play with and the possible configuration for choosing a winner of such a configuration is $2^{2^{n-2}}$
Thus, the sample space representing how the winners are chosen (or the knocked out persons are knocked out) can be calculated by multiplying configurations as obtained in $round_1$ $round_2$, ... $round_n$ by the **rule of product** as: $2^{2^{n-1}} * 2^{2^{n-2}} * .... * 2^1 = X$

$$log_2 X = 2^{n-1} + 2^{n-2} + ... + 1$$
$$log_2 X = \frac{2^{n-1+1} - 1}{2-1}$$

Thus $X = 2^{2^n - 1}$

(5)

Exercise # 1.2: (a)

$A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$
Let $x \in A \cup (B \cap C)$

Prob. II

Prob. II: (a)

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Prob. II: (b)

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Prob. II [Prob. II: (b)] continued on next page...

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Prob. III

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