PROBABILIDADE I - 2ª CHAMADA DA AP.1

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1) Nº DE SUBCONJUNTOS = 2^{15};

DE 1...15 HÁ 7 NÚMEROS PARES. UTILIZANDO O COMPLEMENTAR (TOTAL - OPOSTO), O Nº DE SUBCONJUNTOS COM 5 ELEMENTOS COM PELO MENOS 1 Nº ÍMPAR É:

$$\underbrace{\binom{15}{5}}_{\text{TOTAL}} - \underbrace{\binom{7}{5}}_{\text{TODOS OS SUBCONJUNTOS COM NÚMEROS PARES APENAS}}$$

2) $P(A^c \cap B^c) = P(A \cup B)^c = 1 - (P(A) + P(B) - P(A \cap B))$

$$= 1 - P(A) - P(B) + P(A \cap B)$$

3) $$\sum_{k=0}^{8} \binom{8}{k} \left(\frac{2x^7}{3y^{1/2}}\right)^k \left(\frac{xy}{3y^{1/2}}\right)^{8-k} =$$

$$\sum_{k=0}^{8} \binom{8}{k} \left(\frac{2^k}{3^k}\right)\left(\frac{x^{7k}}{y^{k/2}}\right)\left(\frac{x^{8-k}}{3^{8-k}}\right)\left(\frac{y^{8-k}}{y^{(8-k)/2}}\right) =$$

$$\sum_{k=0}^{8} \binom{8}{k} \left(\frac{2^k}{3^k}\right)\left(\frac{1}{3^{8-k}}\right)^{6k+8} \left(x^{6k+8}\right)\left(y^{4-k}\right)$$

$6k + 8 = 10(4-k)$

$6k + 8 = 40 - 10k$

$16k = 32$

$k = 2$

LOGO, O COEFICIENTE DEVE SER:

$$\binom{8}{2}\left(\frac{2^2}{3^2}\right)\left(\frac{1}{3^6}\right) = 28 \cdot \frac{4}{9} \cdot \frac{1}{729}$$

$$= \frac{112}{6561}$$

4- a) $I_{2^B}(A) = 0$, pois $A \notin 2^B$;

b) $I_{2^{B^c}}(A^c) = 1$, pois $A^c \in 2^{B^c}$;

5- a) ÁTOMOS:

1: $A_1 \cap A_2 = \{A\}$

2: $A_1 \cap A_2^c = \{D\}$

3: $A_1^c \cap A_2 = \{B, C\}$

4: $A_1^c \cap A_2^c = \{\ \}$

$2^3 = 8$ SUBCONJUNTOS CONTIDOS NA ÁLGEBRA;

MENOR ÁLGEBRA CONTENDO OS EVENTOS A_1 e A_2:

$\mathcal{A} = \{\emptyset, \Omega, \{A\}, \{D\}, \{B, C\}, \{A, D\}, \{A, B, C\}, \{B, C, D\}\}$

b- $P(\{A, B, C\}) = P(\{A, D\}) \cdot 5$

$P(\{A, B, C\}) = 5P(\{B, C\})$

$6P(\{A, B, C\}) = 5P(\{A, D\}) + 5(1 - P(\{A, D\})$

$P(\{B, C\}) = 1 - P(\{A, D\})$

$\Rightarrow 6P(\{A, B, C\}) = 5P(\{A, D\}) + 5 - 5P(\{A, D\})$

$\Rightarrow 6P(\{A, B, C\}) = 5$

$P(\{A, B, C\}) = \frac{5}{6}$

$P(\{D\}) = 1 - P(\{D\}^c) = 1 - P(\{A, B, C\})$

$= 1 - \frac{5}{6}$

$= \frac{1}{6}$