

Esercizio 10

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$N =$ NUMERO INTERO CASUALE

$$1 \leq N \leq 8$$

$$A = \{ N \leq 4 \}$$

$$B = \{ 4 \leq N \leq 7 \}$$

$$C = \{ N \text{ è dispari} \}$$

A, B e C sono indipendenti?

$$\Omega = \{ 1, 2, 3, 4, 5, 6, 7, 8 \}$$

$$|\Omega| = 8$$

$$A = \{ 1, 2, 3, 4 \} \rightarrow |A| = 4$$

$$B = \{ 4, 5, 6, 7 \} \rightarrow |B| = 4$$

$$C = \{ 1, 3, 5, 7 \} \rightarrow |C| = 4$$

$$P(A) = \frac{4}{8} = \frac{1}{2}$$

$$P(B) = \frac{4}{8} = \frac{1}{2}$$

$$P(C) = \frac{4}{8} = \frac{1}{2}$$

$$A \cap B \cap C = \{\emptyset\} \rightarrow |A \cap B \cap C| = 0$$

$$P(A \cap B \cap C) = \frac{0}{8} = 0$$

$$P(A \cap B \cap C) = P(A) \cdot P(B) \cdot P(C)$$

$$0 = \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2}$$

$$0 \neq \frac{1}{8}$$

*Già a questo punto possiamo concludere
che i 3 eventi non sono indipendenti.*

$$A \cap B = \{4\} \rightarrow |A \cap B| = 1$$

$$P(A \cap B) = \frac{1}{4}$$

$$P(A \cap B) = P(A) \cdot P(B)$$

$$\frac{1}{4} = \frac{1}{2} \cdot \frac{1}{2}$$

$$\frac{1}{4} = \frac{1}{4}$$

A e B sono indipendenti

$$A \cap C = \{1, 3\} \rightarrow |A \cap C| = 2$$

$$P(A \cap C) = \frac{2}{8} = \frac{1}{4}$$

$$P(A \cap C) = P(A) \cdot P(C)$$

$$\frac{1}{4} = \frac{1}{2} \cdot \frac{1}{2}$$

$$\frac{1}{4} = \frac{1}{4}$$

A e C Sono indipendenti

$$B \cap C = \{5, 7\} \rightarrow |B \cap C| = 2$$

$$P(B \cap C) = \frac{2}{8} = \frac{1}{4}$$

$$P(B \cap C) = P(B) \cdot P(C)$$

$$\frac{1}{4} = \frac{1}{2} \cdot \frac{1}{2}$$

$$\frac{1}{4} = \frac{1}{4}$$

B e C sono indipendenti

$$\textcircled{1} P(A \cap (B \cap \bar{C})) \quad \textcircled{2} P(A \cup (B \cap \bar{C}))$$

$$\textcircled{1} P(A \cap (B \cap \bar{C}))$$

$$\bar{C} = \{ 2, 4, 6, 8 \}$$

$$|\bar{C}| = 4$$

$$B \cap \bar{C} = \{ 4, 6 \} \rightarrow |B \cap \bar{C}| = 2$$

$$A \cap (B \cap \bar{C}) = \{ 4 \}$$

$$|A \cap (B \cap \bar{C})| = 1$$

$$P(A \cap (B \cap \bar{C})) = \frac{|A \cap (B \cap \bar{C})|}{|\Omega|} = \frac{1}{8}$$

②

$$A \cup (B \cap \bar{C}) = \{ 1, 2, 3, 4, 6 \}$$

$$|A \cup (B \cap \bar{C})| = 5$$

$$P(A \cup (B \cap \bar{C})) = \frac{|A \cup (B \cap \bar{C})|}{|\Omega|} = \frac{5}{8}$$