# Probability

## Solved Example

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# Example 01

- In a process that manufactures aluminum cans, the probability that a can has a **flaw on its side is 0.02**, the probability that a can has a **flaw on the top is 0.03**, and the probability that a can has a **flaw on both the side and the top is 0.01**. What is the probability that a randomly chosen can has a flaw? What is the probability that it has no flaw?

# Example

**Solution**

We are given that $P(\text{flaw on side}) = 0.02$, $P(\text{flaw on top}) = 0.03$, and $P(\text{flaw on side and flaw on top}) = 0.01$. Now $P(\text{flaw}) = P(\text{flaw on side or flaw on top})$. Using Equation (2.5),

$$\begin{aligned} P(\text{flaw on side or flaw on top}) = {} & P(\text{flaw on side}) + P(\text{flaw on top}) \\ & - P(\text{flaw on side and flaw on top}) \\ = {} & 0.02 + 0.03 - 0.01 \\ = {} & 0.04 \end{aligned}$$

To find the probability that a can has no flaw, we compute

$$P(\text{no flaw}) = 1 - P(\text{flaw}) = 1 - 0.04 = 0.96$$

Venn diagrams can sometimes be useful in computing probabilities by showing how to express an event as the union of disjoint events. Example 2.9 illustrates the method.

# Example 02

- Refer to Example 01 listed above. What is the probability that a can has a flaw on the top but not on the side?

# Note…

**1- قاعدة المكمل**

**لأي حدث $A$**

$$P(A^c) = 1 - P(A)$$

**2- القاعدة الخاصة لجمع الاحتمالات**

**إذا كان: $A, B$ حدثين في فضاء عينة فإن :**

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

**إذا كانت $A,B$ احداث متنافية فإن**

$$P(A \cup B) = P(A) + P(B)$$

**3- الفرق**

$$P(A - B) = P(A \cap B') = P(A) - P(A \cap B)$$

# Example 02

- Refer to Example 01 listed above. What is the probability that a can has a flaw on the top but not on the side?

# References


- Understanding Boxplots https://towardsdatascience.com/understanding-boxplots-5e2df7bcbd51
- What does a box plot tell you? https://www.simplypsychology.org/boxplots.html
- Statistics for Engineers and Scientists, Fourth Edition, William Navidi Colorado School of Mines
- Khan Academy

https://www.khanacademy.org/math/cc-sixth-grade-math/cc-6th-data-statistics/cc-6th-box-whisker-plots/v/constructing-a-box-and-whisker-plot