0.1 Worked Example - Defective Electronics

Suppose an electronics assembly subcontractor receives resistors from only two suppliers: A and B

- Suppose we are told that Supplier A supplies 80% of the resistors

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- *Probability that a randomly chosen resistor comes from A is 80 % : P(A) = 0.80*
- Supplier B supplies 20% of the resistors
- *Probability that a randomly chosen resistor comes from B is therefore 20% : P(B) = 0.20*

- We are giving information about the rate of faulty components from each supplier. (Faulty : resistor fails some
- 1% of the resistors supplied by A are faulty
- 3% of the resistors supplied by B are faulty

- We are giving information about the rate of faulty components from each supplier. (Faulty : resistor fails some quality test)
- *P(F) probability that randomly selecting compoent is faulty*
- 1% of the resistors supplied by A are faulty.
- *We write this as* $P(F|A) = 0.01$
- 3% of the resistors supplied by B are faulty
- *We write this as* $P(F|B) = 0.03$

Question 1:

- What is the probability that a randomly selected resistor fails the final test?
- In mathematical terms, compute P(F)

Law of Total Probability:

- Faulty Resistors are either from Supplier A or Supplier B.

- *Resistors MUST come from one of the two suppliers.*
- *A and B are mutually exclusive.*

$$P(F) = P(F \text{ and } A) + P(F \text{ and } B)$$