Outline

A simple example of counting

$n = 4$, $m = 2$ defective
$n - m = 2$ non defective

Functional 

Non functional 

A communication system:

- Setup: n antennas lined up
- Functional system:
  $\hookrightarrow$ when no 2 consecutive defective antennas
- We know that m antennas are defective

Problem: compute

$$\mathbf{P}\,(\text{functional system})$$

Example: $n = 4$ $m = 2$ defective

0 $\longrightarrow$ defective 1 $\longrightarrow$ non defective

For small n, m: enumerate all possibilities

0	0	1	1		1	0	0	1
0	1	0	1	functional	1	0	1	0
0	1	1	0		1	1	0	0

$$P(\text{functional}) = \frac{\#\text{ functional systems}}{\#\text{ systems}}$$

$$= \frac{3}{6} = \frac{1}{2}$$

For larger values of n, m

$\rightarrow$ need to count!

A simple example of counting (2)

Particular instance of the previous situation:

- Take $n = 4$ and $m = 2$
- Possible configurations:

$$\begin{array}{ccc} 0011 & 0101 & 0110 \\ 1001 & 1010 & 1100 \end{array}$$

- We get 3 working configurations among 6, and thus

$$\mathbf{P}\,(\text{functional system}) = \frac{1}{2}$$

Conclusion: need an effective way to count, that is

Combinatorial analysis