

Probability Distributions

Part1

**Data Science for Quality Management:
Probability and Probability Distributions**
with **Wendy Martin**

Learning objective:

Describe the concept of a probability distribution

Probability Distributions

- Probability distributions are theoretical frequency distributions which are collectively exhaustive.

Probability Distributions

- For example, suppose we have historical evidence to show that a particular vendor will provide a defective part to us 20 times out of 100. Therefore, the P of receiving a Defective part (D) is:

Probability Distributions

- Let us determine the probabilities associated with any two parts randomly drawn from a large production lot. Given:

1 st Part	2 nd Part	# Def. @ 2 parts	P
D (0.20)	ND (0.80)	1	0.16
D (0.20)	D (0.20)	2	0.04
ND (0.80)	D (0.20)	1	0.16
ND (0.80)	ND (0.80)	0	0.64
		Total	1.00

Probability Distributions

- We can now create a probability distribution conforming to our theoretical expectation for two parts so that:

# of Defectives	Draws	P(D)
0	(ND, ND)	0.64
1	(ND, D) + (D, ND)	0.32
2	(D,D)	0.04

Probability Distributions

In R / Rstudio

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> table.dist.binomial(n, p)
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Sources

The material used in the PowerPoint presentations associated with this course was drawn from a number of sources. Specifically, much of the content included was adopted or adapted from the following previously-published material:

- Luftig, J. An Introduction to Statistical Process Control & Capability. Luftig & Associates, Inc. Farmington Hills, MI, 1982
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