Quantile — Quantile (Q-Q) Plot

r.v X : $x_1, x_2, x_3, \ldots\ldots x_{500}$

(Q) IS X Gaussian Distributed ? $\longrightarrow$ Q-Q Plot

$\longrightarrow$ Statistical Testing
(KS Test, AD Test)

Simple Graphical Method $\nearrow$

what is Q-Q Plot
How to Plot Q-Q Plot
How to read Q-Q Plot

<u>Step 1</u> $x_1, \quad x_2, \quad x_3 \text{ ---------- } x_{500} \rightarrow x_i$

we sort $x_i's$ and compute percentiles

$\downarrow$ sorting (asc)

$x_1', \quad x_2', \quad x_3' \text{ --------- } x_{500}'$

$\downarrow$ percentiles

$x_5', \quad x_{10}', \quad x_{15}', \text{ ---------- } x_{500}'$

1   2   3   ---------- 100

$\downarrow \searrow 1^{st}$ percentile value of $x_i's$

$x^{(1)} \quad x^{(2)} \quad x^{(3)} \text{ ---------- } x^{(500)}$

Step 2 : r. v $Y \sim N(0,1)$ $\longrightarrow$ std Normal Distribution

Y_1 , Y_2 , Y_3 --------- Y_{1000} $\rightarrow$ 1000 random obs. from std. N. D

$\downarrow$ sort (asc)

Y_1' , Y_2' , Y_3' - ------- Y_{1000}'

$\downarrow$ percentiles

$Y^{(1)}$, $Y^{(2)}$, $Y^{(3)}$, --- ---- $Y^{(100)}$

Step 3: Plot Q-Q plot using

$x^{(1)}, x^{(2)}, x^{(3)}, \ldots\ldots x^{(100)}$

$y^{(1)}, y^{(2)}, y^{(3)}, \ldots\ldots y^{(100)}$

→ 100 such pair

$\left\{ \begin{array}{l} x^{(1)}, y^{(1)} \\ x^{(2)}, y^{(2)} \\ x^{(3)}, y^{(3)} \end{array} \right\}$

$\uparrow$
x

$\nearrow x^5$

$(y^{(5)}, x^{(5)})$

y^5
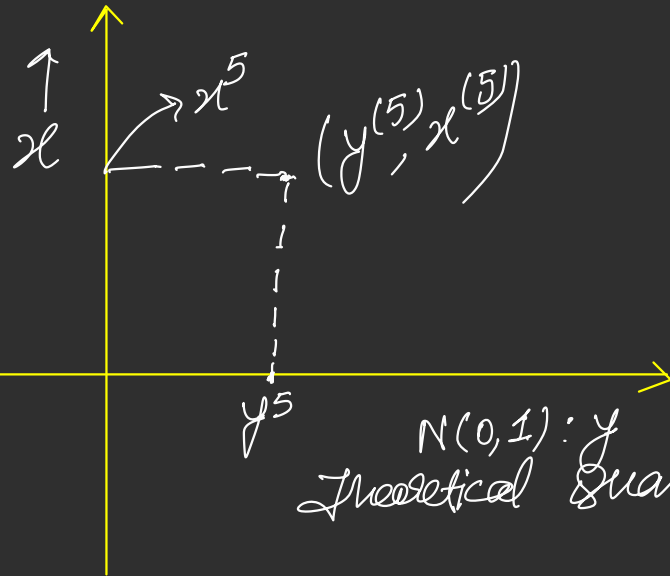
$N(0,1): y$

Theoretical Quantiles