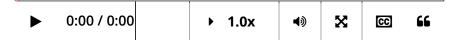# edX

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Quantile-Quantile Plots
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quantile-
quantile plots

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RAFAEL IRIZARRY: In a previous video, we described

how, if a distribution is well approximated

by the normal distribution, we can have a very useful and short summary.

But to check if, in fact, it is a good approximation,

Video

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Textbook link

This video corresponds to the textbook section on quantile-quantile plots.

Key points

- Quantile-quantile plots, or QQ-plots, are used to check whether distributions are well-approximated by a normal distribution.

- Given a proportion p, the quantile q is the value such that the proportion of values in the data below q is p.

- In a QQ-plot, the sample quantiles in the observed data are compared to the theoretical quantiles expected from the normal distribution. If the data are well-approximated by the normal distribution, then the points on the QQ-plot will fall near the identity line (sample = theoretical).

- Calculate sample quantiles (observed quantiles) using the `quantile()` function.

- Calculate theoretical quantiles with the `qnorm()` function. `qnorm()` will calculate quantiles for the standard normal distribution ($\mu = 0$, $\sigma = 1$) by default, but it can calculate quantiles for any normal distribution given `mean()` and `sd()` arguments. We will learn more about `qnorm()` in the probability course.

- Note that we will learn alternate ways to make QQ-plots with less code later in the series.

Code

```r
# define x and z
library(tidyverse)
library(dslabs)
data(heights)
index <- heights$sex=="Male"
x <- heights$height[index]
z <- scale(x)

# proportion of data below 69.5
mean(x <= 69.5)

# calculate observed and theoretical quantiles
p <- seq(0.05, 0.95, 0.05)
observed_quantiles <- quantile(x, p)
theoretical_quantiles <- qnorm(p, mean = mean(x), sd = sd(x))

# make QQ-plot
plot(theoretical_quantiles, observed_quantiles)
abline(0,1)

# make QQ-plot with scaled values
observed_quantiles <- quantile(z, p)
theoretical_quantiles <- qnorm(p)
plot(theoretical_quantiles, observed_quantiles)
abline(0,1)
```

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