

Lecture 9: Normal Approximation

Chapter 3.2

Goals for Today

- ▶ Discuss how to find %'iles for negative values of z
- ▶ Examples
- ▶ Evaluating how “normal” certain data are.

Solving Normal Questions

Whenever solving questions of this sort **ALWAYS** draw a rough picture first and keep in mind:

1. The normal distribution/curve is **symmetric**
2. The total area under the curve is 1

Normal Probability Tables

Alternatively, whereas

- ▶ table on P.429 gives areas to the left of positive values of z .
- ▶ table on P.428 gives areas to the left of negative values of z .

I'm only going to give you P.429 table for exams.

Speeding on I-5

The distribution of passenger vehicle speeds traveling on Interstate 5 Freeway (I-5) in California is nearly normal with a mean of 72.6 mph and a standard deviation of 4.78 mph.

- a) What percent of passenger vehicles travel slower than 80 mph?
- b) What percent of passenger vehicles travel between 60 and 80 mph?
- c) How fast to do the fastest 5% of passenger vehicles travel?
- d) The speed limit on this stretch of the I-5 is 70 mph.
Approximate what percentage of the passenger vehicles travel above the speed limit on this stretch of the I-5.

Speeding on I-5

a) What percent of passenger vehicles travel slower than 80 mph?

Speeding on I-5

b) What percent of passenger vehicles travel between 60 and 80 mph?

Speeding on I-5

c) How fast do the fastest 5% of passenger vehicles travel?

Speeding on I-5

d) The speed limit on this stretch of the I-5 is 70 mph.
Approximate what percentage of the passenger vehicles travel above the speed limit on this stretch of the I-5.

Switching Gears: Normal Approximation

Although we stated that many processes in the physical world look bell-shaped, i.e. roughly normal, we must keep in mind that this is an **approximation**.

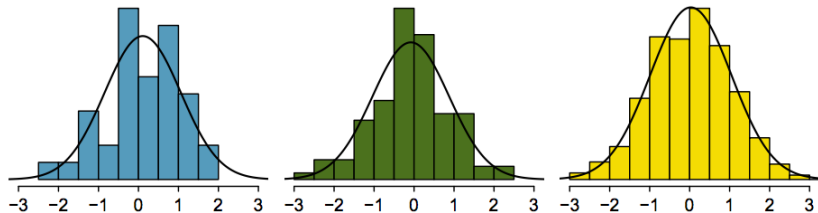
Switching Gears: Normal Approximation

Although we stated that many processes in the physical world look bell-shaped, i.e. roughly normal, we must keep in mind that this is an **approximation**.

Question: How do we verify normality?

Normal Approximation

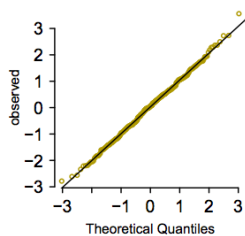
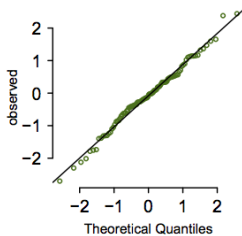
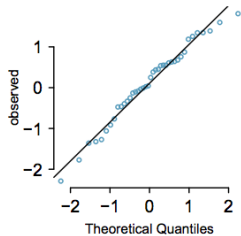
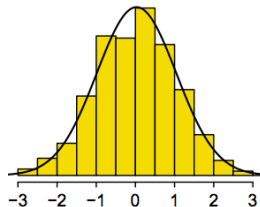
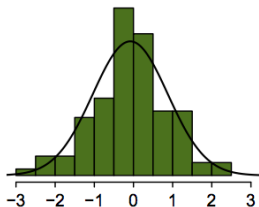
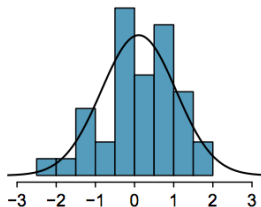
What about these ones? How well do the histograms fit to the normal curve?



Normal Probability Plots

Normal Probability Plots

Normal Probability Plots



Next Time

- ▶ Introduce some of the more useful other distributions:
Bernoulli, Geometric, Binomial, and Poisson