

The Normal Distribution

Reading

- Section 3.1
- Section 3.2

Practice Problems

3.6.1 (p. 158) 3.1, 3.2, 3.3, 3.5, 3.7, 3.9, 3.13, 3.16

3.6.2 (p. 161) 3.17, 3.18

Notes

- The **Normal Distribution** is a bell-shaped curve.
- Its equation depends on two parameters, μ (mean) and σ (standard deviation)
 - μ controls the center
 - σ controls the width. More specifically, it is the distance between the center and the “inflection point”.
- Denoted $N(\mu, \sigma)$.
- We use Table A or calculator/computer for computing values. We will explain shortly.
- Key step: z -scores.

$$z = \frac{x - \mu}{\sigma}$$

- They are a simple rescaling of the x values.
- Can also write:

$$x = \mu + \sigma \times z$$

z scores measure “number of standard deviations away from the mean” that the corresponding x value is.

- z -scores follow **Standard Normal Distribution**. With mean 0 and standard deviation 1.
- It is those z values we can look up in the table.

Working with z values and Table A

- Compute z from x if need be.
- Look z up in the table. For example say $z = 2.31$:
 - Find 2.3 on the left column.
 - Find 0.01 at the top row.
 - Their intersection is the “p-value”.
- p-value is “the percent of values below this value”.
- Use that to compute the answer to the actual question.
- For values with more decimals, round to closest end, or average results in two ends.

Practice questions:

- What percent of the data is below $z = 1.23$?
- What percent of the data is below $z = -1.5$?
- What percent of the data is below $z = -1.555$?
- What percent of the data is above $z = 2.1$?
- What percent of the data is between $z = 1.56$ and $z = 2.1$?

Inverse Lookups in Table A

- Do this if you know a p and want to find a z :
- Make sure the p represents “data below a point”. If not convert it.
- Look for the p INSIDE Table A. You will probably find one value bigger than it, right next to a value smaller than it.
- If your p is closer to one of these values, just use the z from that value.
- If it's closer to the middle between, them, use the average of the two z values.

Practice questions:

- At what z is the first quartile?
- At what z is the third quartile?
- What is the IQR for the standard normal distribution?
- Find the z range where the middle 20% of the data lies.