# Week 5 Notes

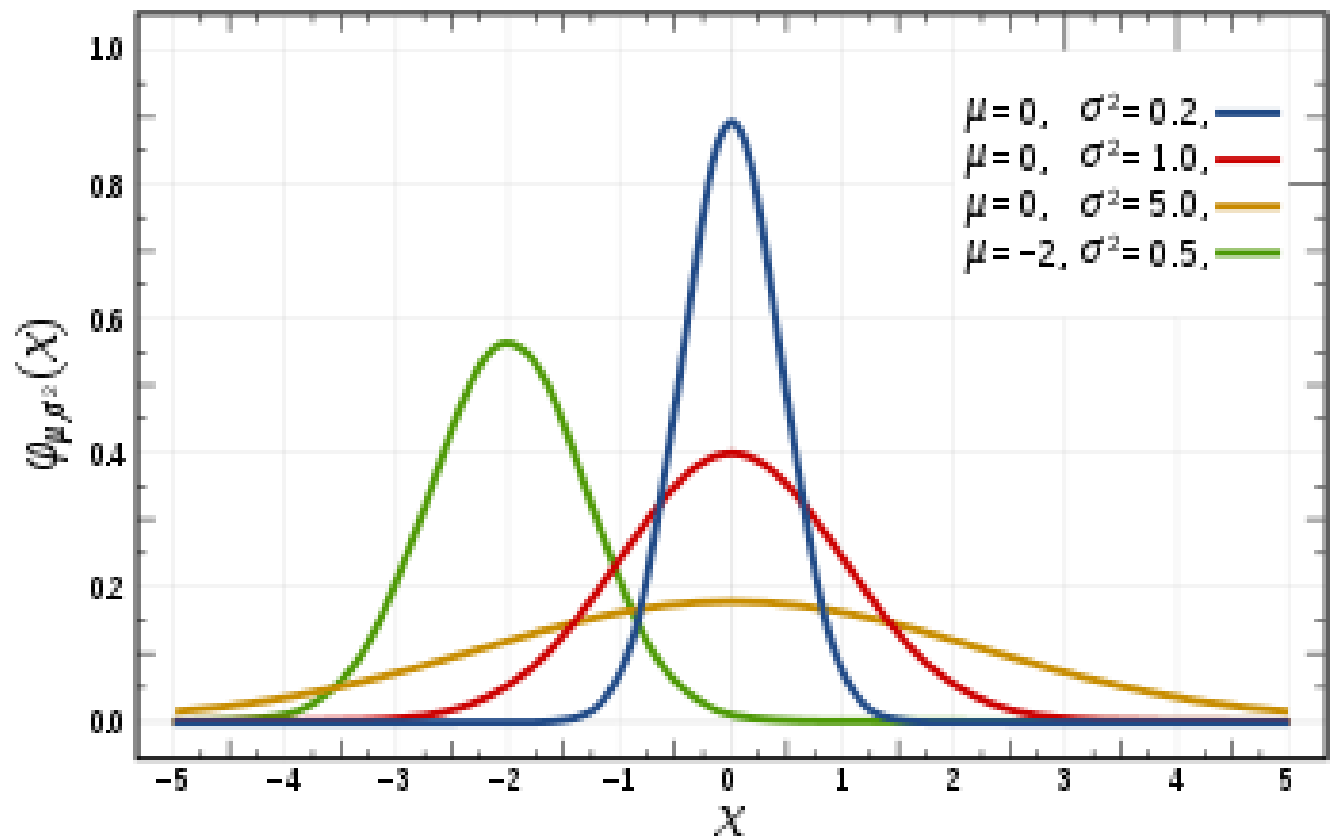## Z-Score:

- A value that have been standardized with a mean μ and standard deviation σ.
  $z = \frac{y - \mu}{\sigma}$

- Standardizing into *z*-scores does not change the *shape* of the distribution of a variable.
- Standardizing into *z*-scores changes the *centre* by making the mean 0.
- Standardizing into *z*-scores changes the *spread* by making the standard deviation 1.
- *z*-scores follow standard Normal model with mean 0 and standard deviation 1.

Normal Model:

- data distribution that looks like a bell curve
- X ~ N(μ, σ) with a mean μ and standard deviation σ
- Mean = mode = median (unimodal)
- The Normal distribution is symmetric about its mean and is non-zero over the entire real line.
- Standard Normal distribution is with mean 0 and standard deviation 1.
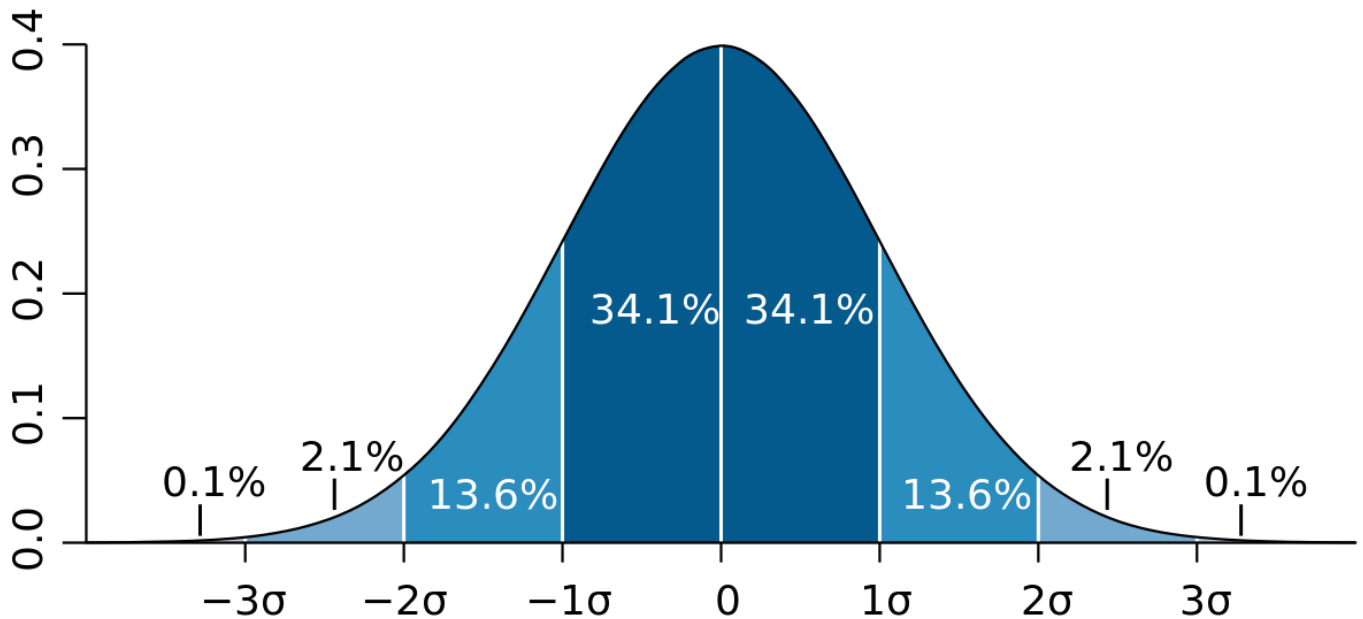
Finding Norma Percentile:

- Type 1 Question: Normal Calculation (Week 3 Slide 15)
  Given a data point x and X ~ N(μ, σ).
  Solve for a probability, e.g. to find P(X < x) for a given x
  >>> Draw a picture
  >>> Standardize: $z = \frac{x-\mu}{\sigma}$
  >>> Use the z-score table
- Type 2 Question: Inverse Normal Calculation
  Given data X ~ N(μ, σ) and p.
  Solve for x such that P(X < x) = p
  >>> Draw a picture
  >>> Use the z- score table to get z
  >>> Go back to the original scale: x = σz + μ

Question 1(Pg 177 5.43): Assume the cholesterol levels of adult women can be described by a Normal model with a mean of 188mg/dL and a standard deviation of 24.

a) Draw and label Normal model.
b) What percentage of adult women do you expect to have cholesterol levels over 200 mg/dL?
c) What percentage of adult women do you expect to have cholesterol levels between 150 mg/dL and 170 mg/dL?
d) Estimate the interquartile range of the cholesterol levels?
e) Below what values are the lowest 40% of women's cholesterol levels?
f) Above what values are the highest 15% of women's cholesterol levels?
g) Above what values are the highest 35% of women's cholesterol levels?