

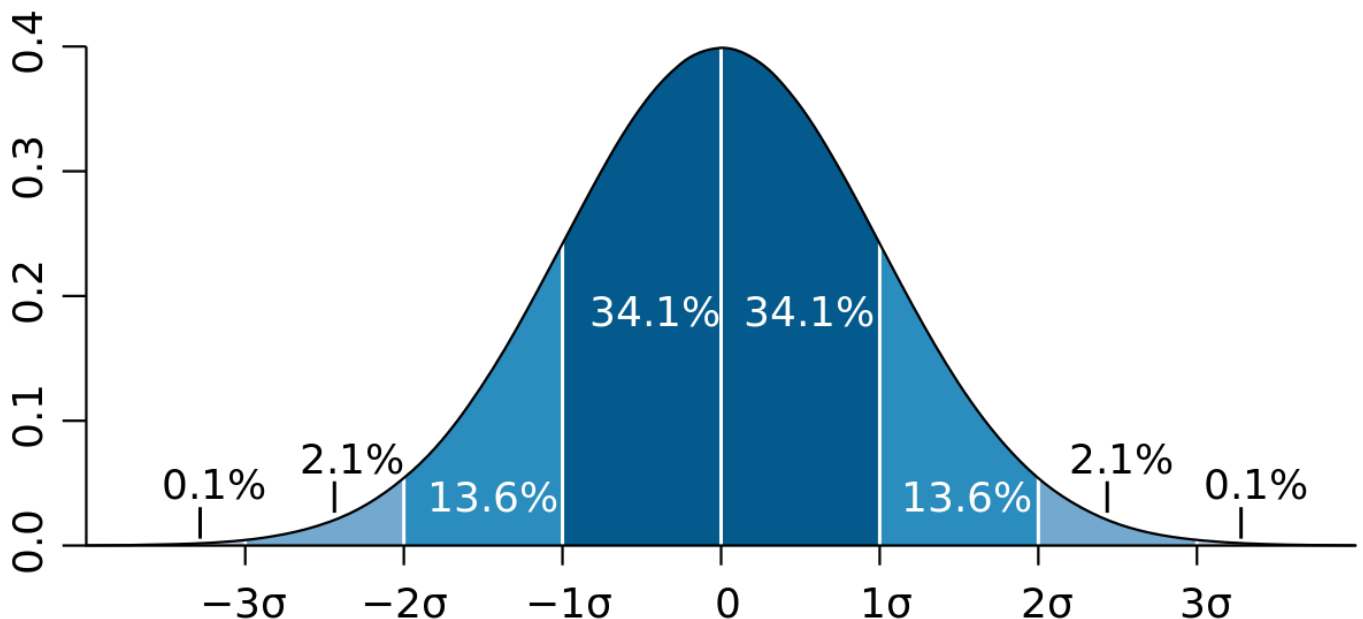
## Week 5 Notes

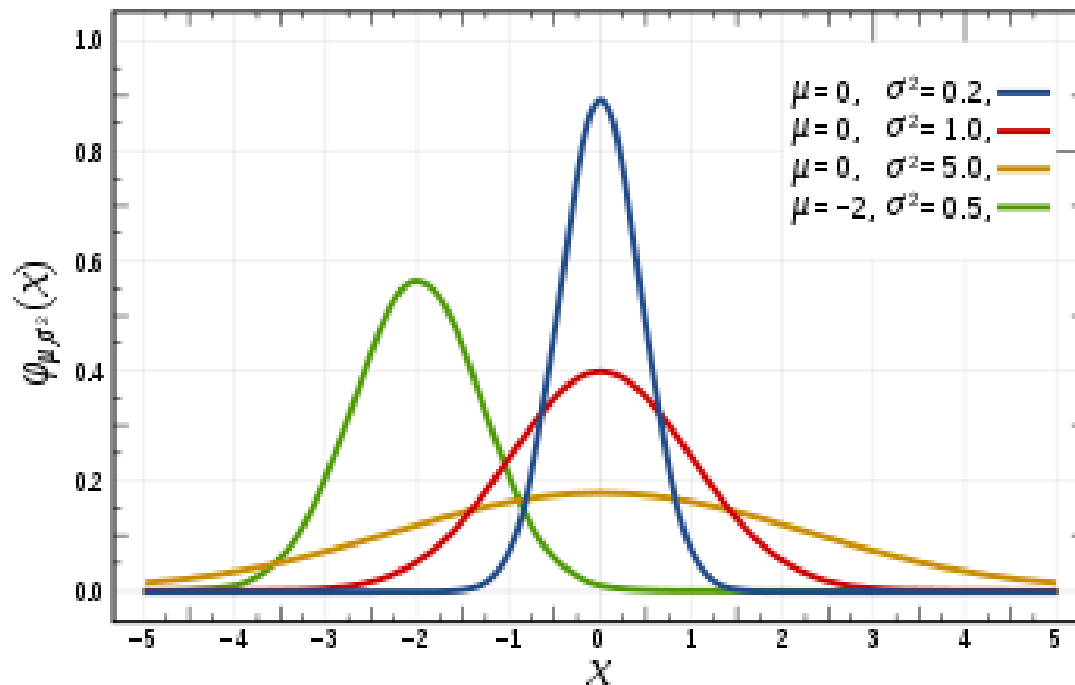
### Z-Score:

- A value that have been standardized with a mean  $\mu$  and standard deviation  $\sigma$ .  
$$z = \frac{y - \mu}{\sigma}$$
- 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
- $X \sim N(\mu, \sigma)$  with a mean  $\mu$  and standard deviation  $\sigma$
- 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 Normal Percentile:

- Type 1 Question: Normal Calculation (Week 3 Slide 15)  
Given a data point  $x$  and  $X \sim N(\mu, \sigma)$ .  
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  $X \sim N(\mu, \sigma)$  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:  $x = \sigma z + \mu$

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.

- 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?