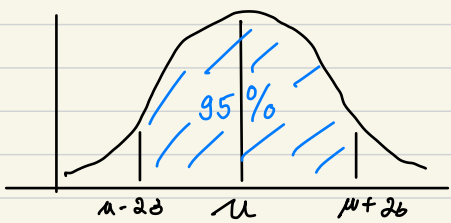
Probability & Statistic

- Normal approximation and Binomial distribution

Normal approximation

- Normal approximation follow a bell curve
  Ex: heights, blood pressure, weights of people

- The empirical rule of normal distribution
  + About 2/3 (68%) of the data fall within 1 std deviation
  + _____ (95%) _____ 2 _____
  + _____ (99,7%) _____ 3 _____



- Standardizing data → $\mu = 0$, $\delta = 1$
  z-score (standardized data):

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

  if $z = 2$ means the height is 2 std deviations above the avg

∴) The standard normal curve:

$$y = \frac{1}{\sqrt{2\pi}} \cdot e^{-1/2 x^2}$$

Binomial distribution

Normal approximation: finding the area under the normal curve

Step 1: Standardize values
Step 2: Mark the area under the normal curve
Step 3: Use software to calculate :))

Compute percentile with normal distribution

What is 30th percentile of the fathers' heights?

$$P(x \leq z) = 30\%$$

$\Rightarrow$ use software to calculate z

$\Rightarrow$ Actual height $= \mu + z.\beta$

- **Binomial formula:** $P(k \text{ successes in } n \text{ experiments}) = C_n^k \times p^k \times (1-p)^{n-k}$

When n gets large, the binomial distribution looks more similar to the normal distribution

To standardize normal distribution, subtract np and devide by $\sqrt{np(1-p)}$