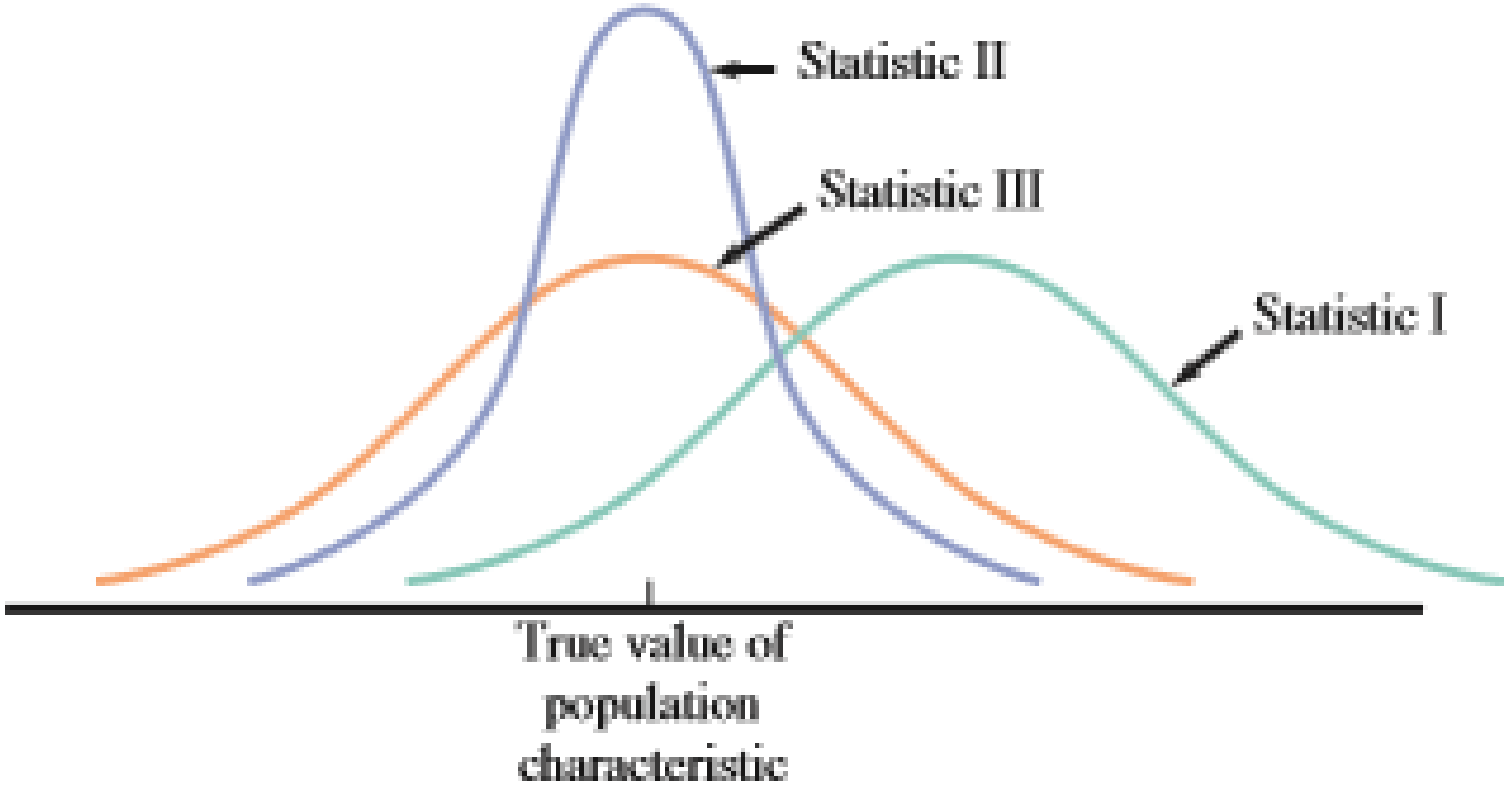
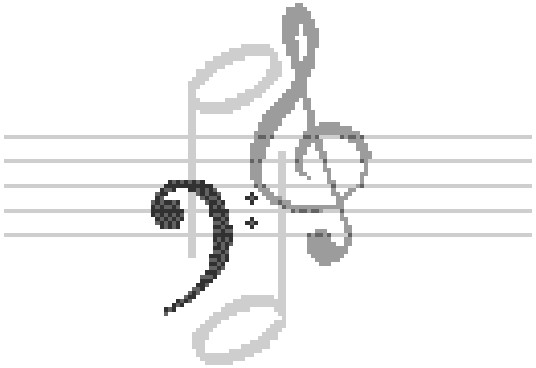
Review...

9.1 ✦ Three different statistics are being considered for estimating a population characteristic. The sampling distributions of the three statistics are shown in the following illustration:

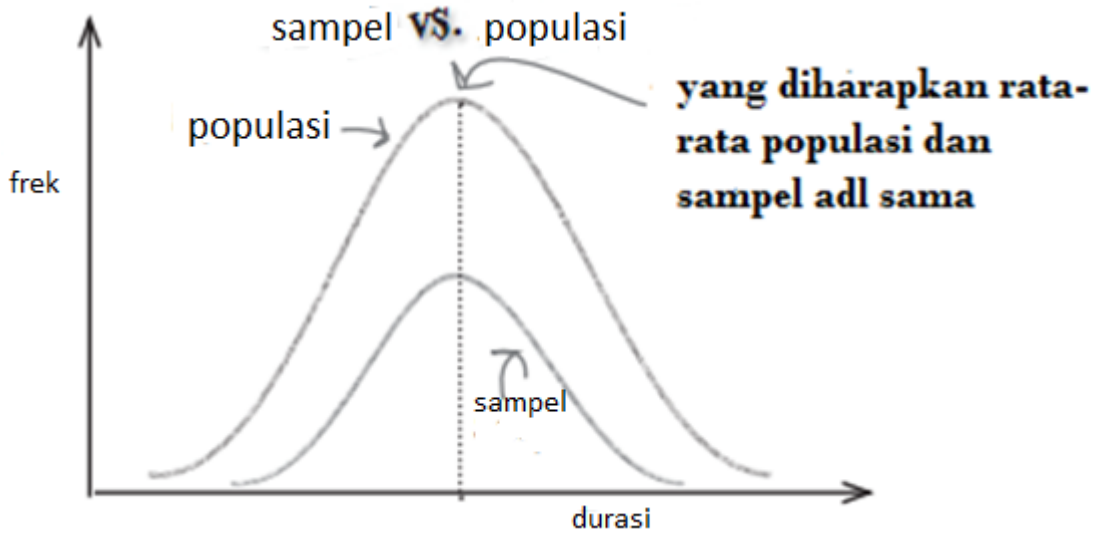


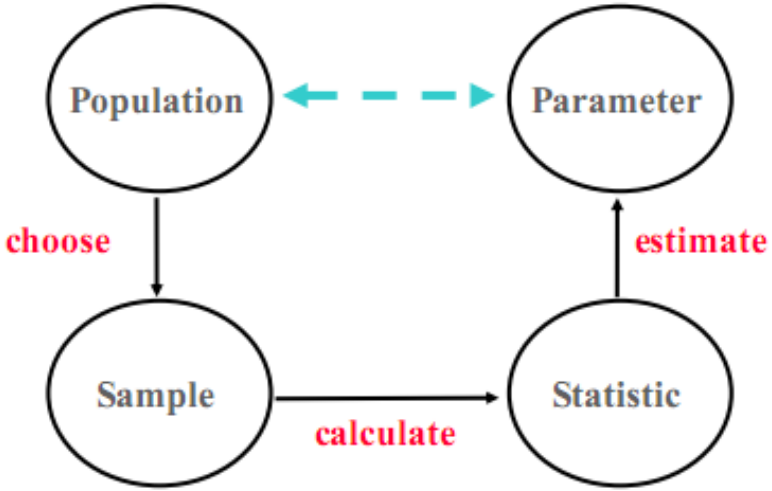


BAB 3

ESTIMASI

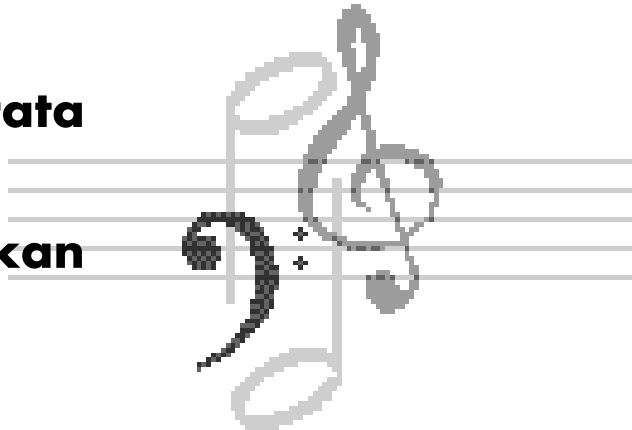
Ilustrasi

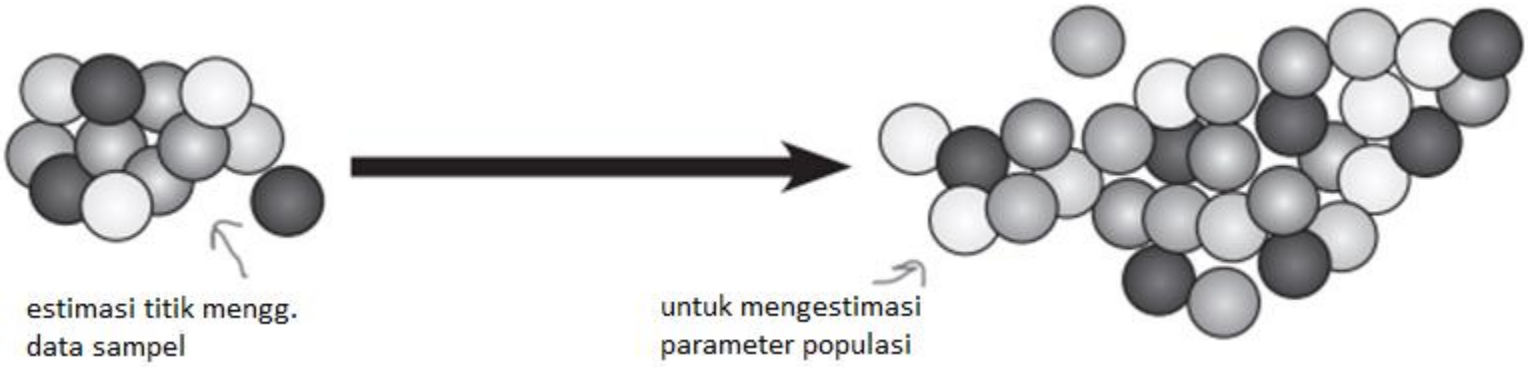




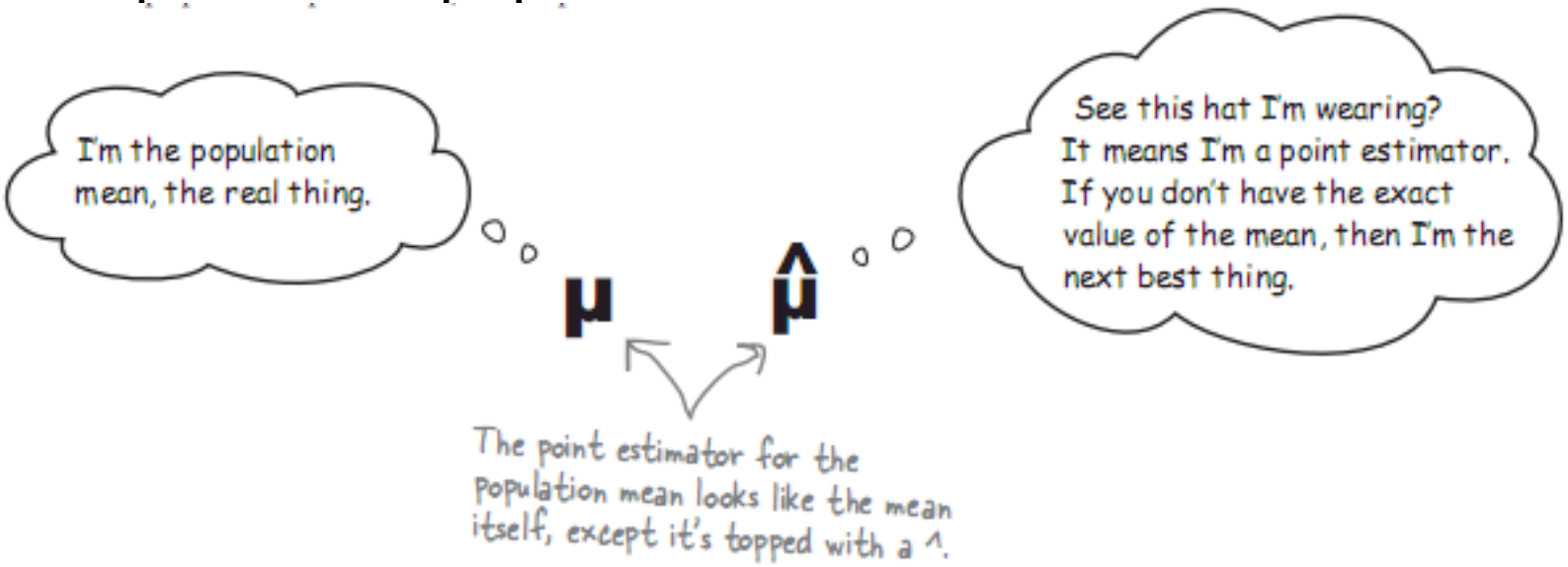
- **Mungkin rata-ratanya tidaklah sama tapi estimasi terbaik dapat ditentukan**
- **Rata-rata sampel→ estimator titik untuk rata-rata populasi**

  →Artinya jika dihitung sampel data akan mengestimasi rata-rata populasi





- Estimator titik dapat menghasilkan nilai pendekatan suatu parameter populasi



A **point estimate** of some population parameter θ is a single numerical value $\hat{\theta}$ of a statistic $\hat{\Theta}$. The statistic $\hat{\Theta}$ is called the **point estimator**.

Estimasi titik

DEFINITION

A point estimate of a population characteristic is a single number that is based on sample data and represents a plausible value of the characteristic.

$\bar{x}$ is the mean of the sample.

$$\bar{x} = \frac{\Sigma x}{n}$$

Add together the numbers in the sample, and divide by how many there are.

Estimasi titik Rata-rata

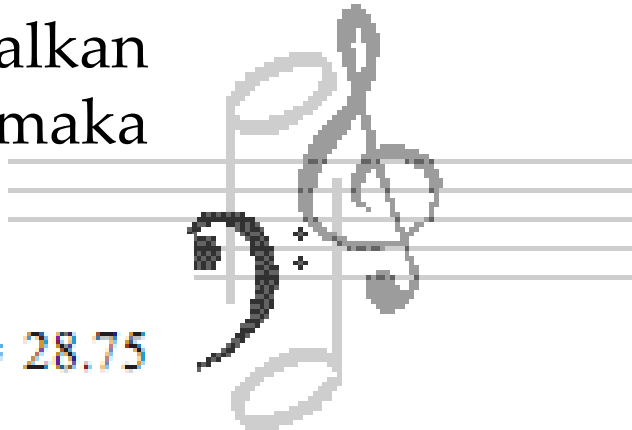
We estimate the mean of the population...

$$\hat{\mu} = \bar{x}$$

...using the mean of the sample.

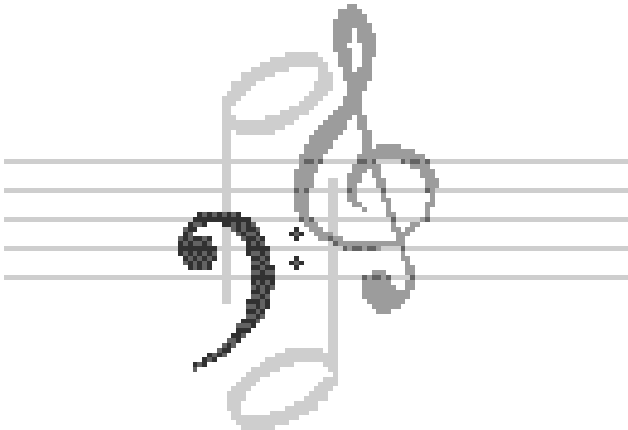
Misalkan variabel random X berdistribusi Normal dengan rata-rata μ tidak diketahui. Misalkan diambil x1=25, x2=30, x3=29 dan x4=31, maka dapat diestimasi rata-ratanya adalah

$$\bar{x} = \frac{25 + 30 + 29 + 31}{4} = 28.75$$



DEFINITION

A statistic whose mean value is equal to the value of the population characteristic being estimated is said to be an **unbiased statistic**. A statistic that is not unbiased is said to be **biased**.



Estimasi titik untuk variansi

Population variance → $\sigma^2 = \frac{\Sigma(x - \mu)^2}{n}$ ← Population mean

← Size of the population

Point estimator for the population variance → $\hat{\sigma}^2 = s^2$

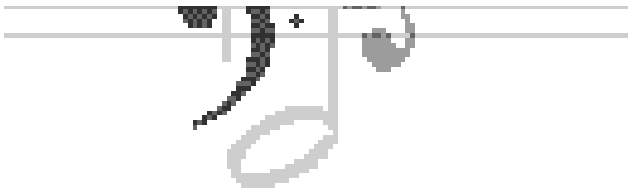
atau

$$s^2 = \frac{\sum (x - \bar{x})^2}{n - 1}$$

Estimator for the population variance → $\hat{\sigma}^2 = \frac{\Sigma(x - \bar{x})^2}{n - 1}$

← Take each item in the sample, subtract the sample mean, square the result, then add the lot together.

← Divide by the number in the sample minus 1.



latihan

9.7 ● Given below are the sodium contents (in mg) for seven brands of hot dogs rated as "very good" by *Consumer Reports* (www.consumerreports.org):

420 470 350 360 270 550 530

a. Use the given data to produce a point estimate of μ, the true mean sodium content for hot dogs.

b. Use the given data to produce a point estimate of σ^2, the variance of sodium content for hot dogs.

c. Use the given data to produce an estimate of σ, the standard deviation of sodium content. Is the statistic you used to produce your estimate unbiased?

Estimasi untuk Proporsi

- Jika X menggambarkan jumlah **sukses** dalam suatu populasi maka X mengikuti distribusi Bin(n,p)
- Misal akan diestimasi rata-rata populasi ???
- Estimasi rata-rata populasi → rata-rata sampel
- Proporsi sukses dalam populasi → proporsi sukses dalam sampel

Point estimator for the proportion of successes in the population → $\hat{p} = p_s$ ← Proportion of successes in the sample

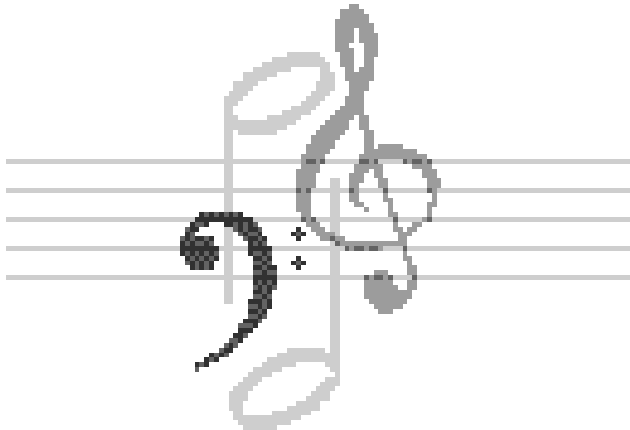
dengan

$$p_s = \frac{\text{number of successes}}{\text{number in sample}}$$

contoh

- Misal diteliti hobi anak-anak terhadap game online di suatu daerah XZ. Diambil sampel sebanyak 40 anak, dan ternyata 32 anak menyukai game online

  → Ps=0.8 ; estimasi titik untuk proporsi sukses (anak menyukai game online) dalam populasi adalah 0.8



Latihan

7-12. Data on oxide thickness of semiconductors are as follows: 425, 431, 416, 419, 421, 436, 418, 410, 431, 433, 423, 426, 410, 435, 436, 428, 411, 426, 409, 437, 422, 428, 413, 416.

(a) Calculate a point estimate of the mean oxide thickness for all wafers in the population.

(b) Calculate a point estimate of the standard deviation of oxide thickness for all wafers in the population.

(c) Calculate the standard error of the point estimate from part (a).

(d) Calculate a point estimate of the median oxide thickness for all wafers in the population.

(e) Calculate a point estimate of the proportion of wafers in the population that have oxide thickness greater than 430 angstrom.