

Sec. 9.3

var. : 0, 1, 0, 0, 1

$$\text{prop.} = \frac{0+1+0+0+1}{5} = \frac{2}{5}$$

$\bar{x}$ → avg.
→ SD
→ normal

$\hat{p}$ → avg.
→ SD
→ normal

Sample proportion : $\hat{p}$
 0.6, 0.2, 0.5, 0.3, 0.45, 0.35

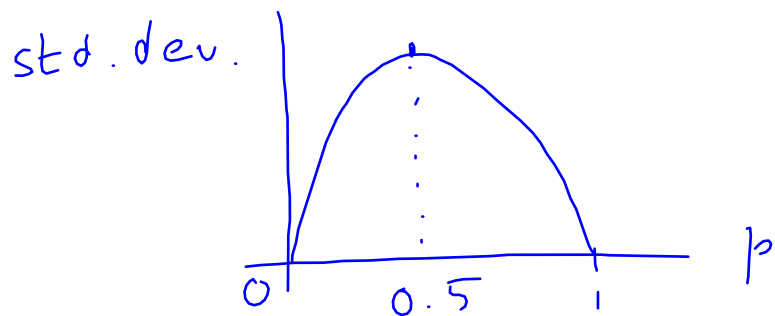
Popul. " : p $p = 0.4$

$$E(\hat{p}) = p \quad (\text{unbiasedness})$$

$$\text{std. dev}(\hat{p}) = \sqrt{\frac{p(1-p)}{n}}$$

↓
 max. at $p = 0.5$

$$\approx \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$



e.g. $p = 0.25$
 $1-p = 0.75$

$n = 10$

$\Rightarrow$ can't use normal

$\hat{p} \rightarrow$ normal

$np \geq 10$

$n(1-p) \geq 10$ $n = 100$

$np \geq 10$ $n(1-p) \geq 10$

$\Rightarrow$ can use normal

$$p = 0.25$$

$$1-p = 0.75$$

$$np = 200 \times 0.25$$

$$= 50$$

$$n(1-p) = 200 \times 0.75$$

$$= 150$$

$$\text{Sample} \rightarrow n = 200$$

$$\hat{p} = \frac{80}{200} = 0.4$$

$$1-\hat{p} = 0.6$$

$$P(\hat{p} > 0.3)$$

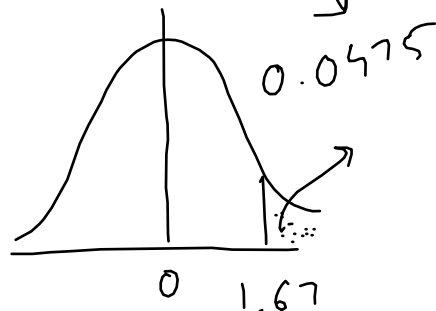
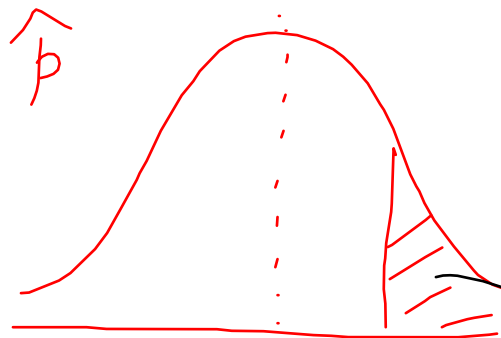
$$= P\left(Z > \frac{0.3 - 0.25}{0.03}\right)$$

$$= 1.67$$

$$= 0.03$$

$$\text{avg. of } \hat{p} = 0.25$$

$$\text{SD of } \hat{p} = \sqrt{\frac{0.25 \times 0.75}{200}}$$



Sec 9.4

Probability

Sampling

support statistical
analysis

estimation of
sampling error

Non-probability

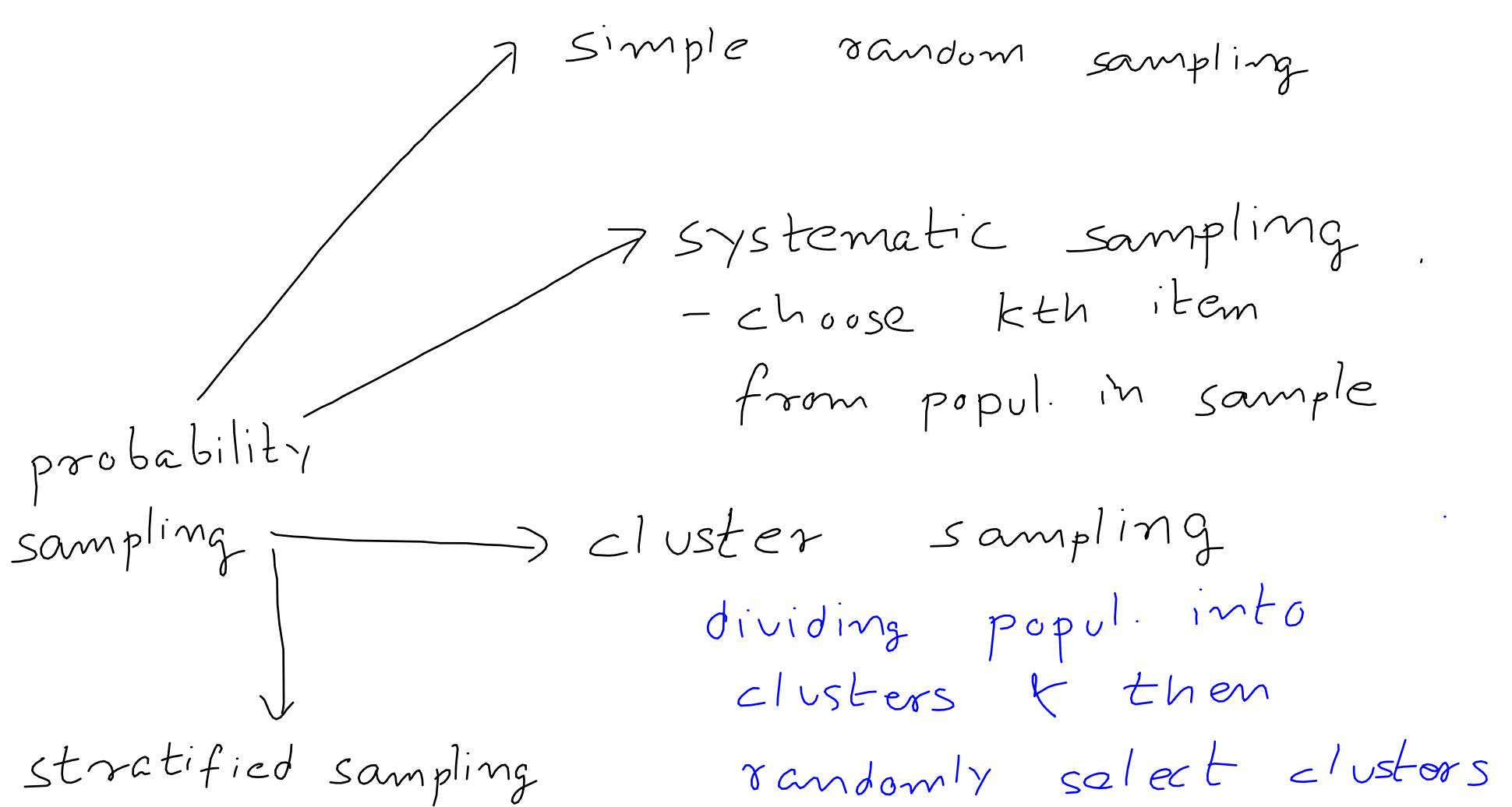
Sampling

does not support
statistical
analysis

convenience
sampling

judgement
sampling

snowball
sampling



Divide pop. into strata

e.g. majors

A & S : 30%

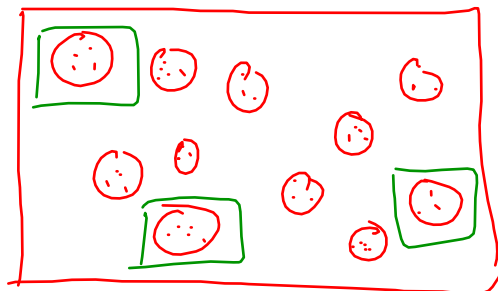
Bus. : 15%

Health : 15%

Educ. : 10%

Music : 5%

Others : 25%



sample from each group

$n = 100$

A & S $\rightarrow 30$

Bus. $\rightarrow 15$

sec. 10.1

parameter

$\mu \rightarrow 30$

point
estimator
 $\bar{x} \rightarrow 26$

$[\bar{x} - \text{error}, \bar{x} + \text{error}]$
point
estimate

$26 - 6, 26 + 6$

$20, 32$

interval
estimator