5.1 Data and sampling

Name: _____ Class: _____ Date: _____ **Total: 16 marks**

KEY WORDS sample • bias • data dictionary

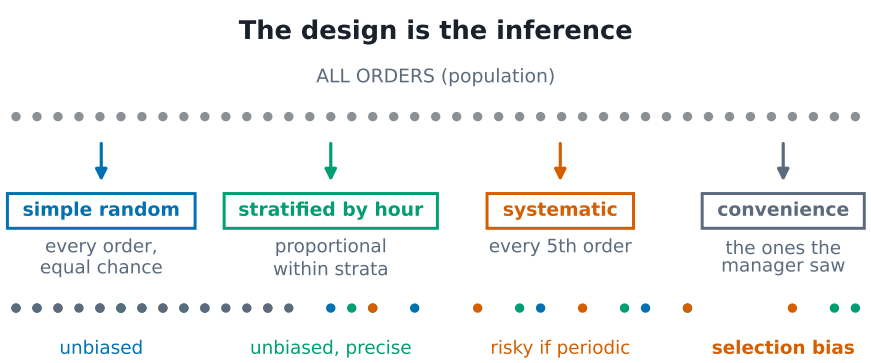
Objective

Classify data types and scales; choose sampling designs to match claims; read a data dictionary and its missingness critically.

1 Key knowledge and worked examples

■ **The design is the inference**

A **sample** supports claims about a **population** only through its design: random sampling earns population claims; **stratified** sampling earns comparisons. **Bias** is systematic and survives any sample size. The **data dictionary** records units, codings and what missing means.



size cannot cure bias: 10,000 convenience orders still say nothing about lunch

What you sampled is what you can claim about

■ **Worked example. Nimbus's weekend question**

"Weekends slower?" needs 20 Saturday + 20 Wednesday orders (stratified) – 40 Saturday orders answer Saturday only; the manager's remembered orders answer nothing. And the dictionary's 3 missing timer values are reported with the mean of the 37 complete cases, never silently.

2 Practice

2.1 For each field – delivery minutes; hour of day (11–21); rider code; satisfaction 1–5 – state quantitative or categorical, and the measurement scale. [4]

2.2 Nimbus wants to estimate average weekday delivery time to within ±1 minute. Rank these designs and justify: (a) every 10th order of the week, (b) a random sample of 200 weekday orders, (c) the 200 orders nearest the shop. [3]

2.3 The survey of 500 customers has a 22% response rate, and responders order 30% more often than average. Name the bias and state in one line what it does to the estimated satisfaction. [3]

2.4 A dataset has 40 rows and 3 missing delivery times. Two analysts report means of 27.43 (37 cases) and 25.52 (zeros filled). Which is defensible, and what must accompany it? [3]

2.5 True or false, one line each: (a) a bigger convenience sample becomes representative; (b) stratified sampling needs the strata sizes known; (c) the population is every order the service could have taken that week. [3]