

LEVELS OF MEASUREMENT: ANSWERS AND DISCUSSION

1. (a) V2 (b) V4 (c) V1 or V3 (d) V1 (e) V3

2. **Note.** As noted in the *Variables* handout (and PPT) and the Problem Set itself, these distinctions pertain to *non-dichotomous* variables (with three or more values, in addition to missing data) only, so only such variables should be selected from the Codebook. The instructions asked you to give substantive as well as formal names of variables (e.g., ABORTION OPINION as well as V14); I did not “decode” and grade answers that did not provide substantive names.

(a) ***Nominal***

V04	PRESIDENTIAL VOTE (if there are three or more candidates)
V30	MOST IMPORTANT NATIONAL PROBLEM
V59	RACE (given OTHER category)
V61	MARITAL STATUS
V63	EMPLOYMENT STATUS
V64	OCCUPATION (given inclusion of FARM category [otherwise arguably ordinal])
V67	RELIGION
V69	REGION
V70	URBANISM (maybe — is SUBURBAN “between” CENTRAL CITY and RURAL?)

(b) ***Ordinal***

Essentially all (non-dichotomous) Codebook variables other than the (pretty clearly) nominal ones listed above and the (less clearly) interval ones listed below are ordinal in nature. Here are some of the less obvious ones.

V05	TIME OF VOTE DECISION (ordered earlier to later)
V13	MEDIA EXPOSURE INDEX (ordered fewer to more)
V34-38	All IDEOLOGY items (ordered liberal to conservative)
V39	PARTY IDEOLOGICAL DISTANCE (ordered less to more)
V45	ABORTION (ordered restrictive to permissive)
V65	INCOME (ordered by percentiles [to be discussed later])
V68	CHURCH ATTENDANCE (ordered by frequency)

(c) ***Interval***

Interval variables have values that are numbers that can appropriately be added, subtracted, and averaged. All SETUPS data is recorded in discrete (and mostly ordered — see above) categories that are not themselves numerical in nature. But the data for the following variables was originally collected in numerical/interval form:

V01	YEAR OF SURVEY (actual year at equal four-year intervals)
V25-28	All FEELING THERMOMETERS (actual "temperature")
V60	AGE (actual year [or birth date])
V65B-D	DOLLAR INCOME (data originally collected in \$000s per year) [PERCENTILE INCOME is <i>ordinal</i> by construction]

Also, variables such as the following are often treated as interval (maybe without great justification):

V34-39 IDEOLOGY V41-44, 46-47 ISSUE SCALES

Also these might be regarded as interval:

V05 TIME OF VOTE DECISION V13 MEDIA EXPOSURE INDEX

3. A continuous variable is a quantitative (interval or ratio) variable for which any point along (some interval on) the real number line is a possible value (whereas a quantitative discrete variable has only whole number values). All variables listed under (c) above except V01 (clearly discrete) and V13 (based on a count) — and especially AGE, INCOME, and THERMOMETER items — might be regarded as “truly continuous.”

Note 1. Some people identified (quite appropriately) AGE and INCOME as “truly continuous” variables, but they then added comments that suggested that they misunderstand what a continuous variable is. AGE and INCOME are *not* continuous variables because they are “continuously” changing (we’re getting older all the time and our income goes up and down; discrete variables may also change their values over time) nor are they continuous because neither variable has a definite upper limit (NUMBER OF CHILDREN has no definite upper limit but is discrete). They are continuous because their values can be any points along a continuum (i.e., a real number line) — not just certain discrete points (probably corresponding to whole numbers) along the way.

Note 2. Quite a few people called RELIGION, REGION, OCCUPATION, MOST IMPORTANT PROBLEM among others continuous, on the grounds that the categories shown in the codebook can be refined into smaller and smaller categories. This is true, but they cannot be refined into an infinite number of categories and they are all qualitative (and nominal) variables that do not have numerical values in the first place.

4. (a) *ratio* (b) *nominal* (c) *ordinal*
 (d) *ratio* (e) *ordinal* (f) *ratio**
 (g) *nominal* (numerical codes for players' names [“nominal” means “in name”]**)
 (h) *ratio*
 (i) at least *interval*, probably *ratio*
 (j) *nominal* (perhaps *ordinal*, but see above re SETUPS V64)
 (k) in U.S. at least *ordinal*, probably *interval*, possibly even *ratio***

* *Winning percentage* and *Games Behind Leader* indicate, in slightly different ways, the “distances” (or “intervals”) between teams in the rankings/standings.

** The numbers on players’ shirts are numerical codes for their names. In the old days, team rosters listed on a score card provided the “codebook” for identifying the players; today the names of players also appear on their uniforms.)

*** In urban areas where streets form rectangular blocks, house numbers often go up or down by 100 each block. In this case the house number scale is essentially *interval* since, given two house numbers, you can not only tell which of two houses is further down the street but how many blocks further it is. It may further be the case that (for examples) the first block of West Maple Street (with numbers 1-99) and the first block of East Maple Street are adjacent, both abutting Main Street (the “0 point” from which street numbers on cross streets are counted). In this case, if you know that Smiths live on the 800 block, and the Joneses live on the 400 block, of West Maple, you also know that the Smiths live twice as far from Main Street as the Joneses, so the house numbers even convey *ratio* information.