

## Lecture 2b: Practice Problems

### Practice

Everything that appears in the lecture notes are fair game for the test. They are the best “study guide” I can provide. It is impossible to provide a “list” that is more comprehensive than the lecture notes above. However, here are a few additional practice exercises or practice concepts.

There are also other “practice problems” embedded in the body of the lecture you should do as well. The answers to my examples in the lecture *can and should be used* as practice problems.

Below you will classify each of the following variables in two ways (and remember, sometimes the correct answer is “it could be either depending upon how it is measured”)

- nominal, ordinal, interval, or ratio
- continuous or discrete

**Don't overthink lecture 2 practice problems:** do not read too closely into these answers I provide below and start creating "demons" in you head. Or as I say in real class "Don't have sex with your mind." My tests will make it **very very clear** whether it's discrete/continuous and NOMINAL ORDINAL INTERVAL RATIO or “NOIR.”

As for NOIR? The only interval variable I know of is temperature so that will be on test.

### ***An important note about continuous vs discrete for the tests***

In the text of lecture 2 I explain this much better on approximately page 2 in the section on “continuous variables.” By the way you should know how to use a “find” function in an app. It's usually something like “command-f” or “control-f” or under the “edit” menu command.

To be clear when we think about continuous vs discrete variables that are real numbers it's kind of weird when you think about theory vs practice.

So theoretically every dollar amount is continuous, like this example from a particularly brilliant student: Every time we purchase gas we are dealing with a product sold in-between cents. Ex. \$4.8099/gal. But in practice we pay in whole pennies

right? Also, they have to end the decimals somewhere correct? Doesn't that technically make it discrete? I think so.

So theoretically any "money" variable is continuous, but in practice we have to stop the decimal points somewhere. The same is true when they measure time in a race for the Olympics right? If it is the 100 meter dash, they use seconds and they only go as far as two decimals – even though time is theoretically continuous. Typically, they stop at one-hundredths of a second as when Usain Bolt set a world record at 9.58 seconds.

[But it does not really matter in practice. Almost always the theory behind "real number" variable tests or computation assumes a "continuous variable." So, in theory, many "real number" variables example are continuous in theory but measured in practice discretely. Or they can be a real number that is discrete like "number of deaths" described below.]

On the test I will be crystal clear if there is a clearly correct answer. There will also be some questions where the correct answer is "it depends on how it's measured."

For example, if I ask "Kelly measures age in whole years. Is this continuous or discrete?" The correct answer is clearly discrete as it says "whole years."

If I ask "The CDC measured the number of COVID deaths. Is this continuous or discrete? Well there is no such thing as a fraction of a death, so it is discrete. The person either died or did not. [Do not have sex with your mind and thinking, "What about people who technically died but came back to life?" If they lived after CPR or whatever they were not measured as a death.]

If I ask "Kelly measures the exact length of a person's surfboard in inches. He uses a really sophisticated measuring device that allows very precise measurement. He will not use either/or categories, but will measure them exactly. Classify the variable." In this case the answer is "continuous."

If I ask Kelly measures the length of a surfboard in inches and I don't give you any other hints the correct answer is "it could be either continuous or discrete depending on how he decides to measure it."

## Start of practice problems

classify each of the following variables in two ways (and remember, sometimes the correct answer is "it could be either depending upon how it is measured")

- nominal, ordinal, interval, or ratio
- continuous or discrete

1. # of times used marijuana in life time \_\_\_\_\_
2. color of hair: 1=brown 2=black 3= blond 4=red
3. ski run classifications 1= easiest 2= more difficult 3= most difficult

4. are you diabetic?: 1= yes 2=no
5. goldilocks porridge 1= too cold 2= just right 3= too hot
6. height of waves at Waimea Bay \_\_\_\_
7. # of surfers in water at Waimea Bay \_\_\_\_
8. length of surfboard \_\_\_\_ft \_\_\_\_inches
9. temperature of water at Waimea Bay \_\_\_\_
10. What is your favorite brand of surf shorts 1= quicksilver 2=hurley 3=dahui
11. Do you surf? 1= yes 0=no
12. How many children have you given birth to? \_\_\_\_\_
13. How much do you weigh? \_\_\_\_\_
14. How tall are you? \_\_\_\_\_ (insert number of inches)
15. I hate homework. 1=disagree 2=neutral 3=agree
16. I wish I did not have to take stats. 1=strongly disagree 2= disagree 3=neutral 4=agree 5=strongly agree
17. Age \_\_\_\_\_
18. Income \_\_\_\_\_
19. Gender 1=male 2=female
20. Ethnicity 1=Polynesian 2= Asian 3= other
21. Are you a West Oahu Student 1= yes 0=no
22. How many miles is your daily commute? \_\_\_\_\_
23. How many minutes does your daily commute take? \_\_\_\_\_
24. How many pounds does your dog weigh? \_\_\_\_\_
25. How many pounds does your dog weigh? \_\_\_\_\_(enter number of whole pounds)
26. How many miles is your daily commute? \_\_\_\_\_ (enter number of whole miles)
27. How many minutes does your daily commute take? \_\_\_\_\_ (enter number of whole minutes)
28. What is your favorite t-shirt size? 1=small 2=medium 3=large 4=extra large 5=I'm bigger than xl baby!
29. Age 1=10-14 years 2=15-19 years 3= 20 or above
30. Age: 1=10-14 years 2=15-19 years 3=20-24 years 4=25-29 years
31. Year of in relation to Christ. So for example, we use calendar years starting at zero (the birth of Christ) and count up. So if you asked some one "what is the year of your birth" or "in what year did you learn to drive?"
32. What is your favorite shade of brown? \_\_\_\_\_dark brown \_\_\_\_\_brown \_\_\_\_\_tan (please choose one)
33. About how much money per month do you spend on transportation? \_\_\_\_\_(enter whole dollars)
34. Are you currently an enrolled student at UHWO? \_\_\_\_\_yes \_\_\_\_\_no
35. Prison sentences are a good way to discourage people from using illegal drugs.Yes (1) No (0)

36. Keeping drug illegal is the best way to lower the societal costs of drug abuse.  
agree (1) neutral (2) disagree (3)
37. About how much money does it cost per year to keep a drug user in prison?  
\_\_\_\_\_ (enter exact \$ amount)
38. About how much money does Hawaii spend per year keeping non-violent drug  
users in prison? \_\_\_\_\_ (enter exact \$ amount)
39. I support the death penalty Yes (1) No (0)
40. What do you think costs more? (circle only one) The death penalty (1)  
"Life" in prison (40 years) (2) I think they both cost about the same (3)
41. About how much money does it cost the government to convict and execute a  
murder? \_\_\_\_\_ (enter exact \$ amount)
42. About how much money does it cost the government to keep a murder in prison  
for 40 years? \_\_\_\_\_ (enter exact \$ amount)
43. College students should be required to take statistics. Yes (1) No (2)
44. I agree with Mark Twain– there are three kinds of lies: lies, damn lies, and  
statistics.  
Strongly Disagree (1) Disagree (2) Neutral (3) Agree (4) Strongly  
Agree (5)
45. How many statistics courses should college student be required to take  
\_\_\_\_\_(enter exact number of courses)
46. How many math courses should college student be required to take  
\_\_\_\_\_(enter exact number of courses)
47. A basic knowledge of statistics is important to being an informed citizen  
Disagree (1) Neutral (2) Agree (3)
48. I'm sick of doing practice problems Yes (1) No (2)

## answers:

N=nominal O= ordinal I= interval R=ratio

C=continuous D= discrete

1. # of times used marijuana in life time (R D) there is no such thing as half a time using marijuana
2. color of hair (N D)
3. ski run classifications (O D)
4. are you diabetic? (N D) any "yes no" question is nominal discrete
5. goldilocks porridge (O D) the porridge is getting hotter so it's ordinal, but there is nothing in between categories so it's discrete
6. ht. of waves at Waimea Bay (R C or D\*) it is theoretically continuous although you could argue that most surfers measure wave height in whole feet making it discrete. So in this case it would depend on how it is measured.
7. # of surfers in water at Waimea Bay (R D) this is discrete because there is no such thing as "half a surfer"
8. length of surfboard (R C or D\*) theoretically it is continuous although you could argue that most surfers measure their surfboards in whole inch increments making it discrete. So in this case it would depend on how it is measured.
9. temperature of water at Waimea Bay \_\_\_\_ (I C or D\* ) it is theoretically continuous although you could argue that if you measured it in whole degrees it would be discrete. So in this case it would depend on how it is measured.
10. Brand of surf shorts (N, D)
11. Do you surf? (N,D) again any yes/no question is nominal and discrete)
12. Children given birth (R, D) this would be ratio and discrete as there is no such thing a half a kid.
13. Weight: (R, C or D\*) theoretically it is continuous although you could argue that most people measure their weight in whole pound increments making it discrete. So in this case it would depend on how it is measured.
14. How tall are you? (R, C or D\*) theoretically it is continuous although you could argue that most people measure their height in whole inch increments making it discrete. So in this case it would depend on how it is measured.
15. Hate homework: (O, D). The levels of agreement grow with the numbers but they are not real numbers as 2 is not "twice as much agreement" as 1.
16. Take stats: (O, D). The levels of agreement grow with the numbers but they are not real numbers as 2 is not "twice as much agreement" as 1.
17. Age \_\_\_\_\_(R, C or D\*) theoretically it is continuous although you could argue that most people measure their age in whole year increments making it discrete. So in this case it would depend on how it is measured.
18. Income \_\_\_\_\_ (R, D) Here I would say the best answer is it is discrete as in US dollars there is nothing in between cents.
19. Gender 1=male 2=female (N, D)
20. Ethnicity 1=Polynesian 2= Asian 3= other (N,D)
21. Are you a West Oahu Student 1= yes 0=no (N,D)
22. How many miles is your daily commute? \_\_\_\_\_ R, C or D\*) theoretically it is continuous although you could argue that most people measure their commute

- in whole minute increments making it discrete. So in this case it would depend on how it is measured.
23. How many minutes does your daily commute take? \_\_\_\_\_ (R, C or D\*) theoretically it is continuous although you could argue that most people measure their commute whole minute increments making it discrete. So in this case it would depend on how it is measured.
  24. How many pounds does your dog weigh? \_\_\_\_\_ (R, C or D\*) theoretically it is continuous although you could argue that most people measure the weight in whole pound increments making it discrete.
  25. How many pounds does your dog weigh? \_\_\_\_\_ (enter number of whole pounds) (R, D) theoretically it is continuous although here I tell you to measure the weight in whole pound increments making it discrete.
  26. How many miles is your daily commute? \_\_\_\_\_ (enter number of whole miles) \_\_\_\_\_ (enter number of whole pounds) (R, D) theoretically it is continuous although here I tell you to measure in whole mile increments making it discrete.
  27. How many minutes does your daily commute take? \_\_\_\_\_ (enter number of whole minutes) (R, D) theoretically it is continuous although here I tell you to measure in whole minute increments making it discrete.
  28. What is your favorite t-shirt size? 1=small 2=medium 3=large 4=extra large 5=I'm bigger than xl baby! (O,D). I cover the reasons in the lecture
  29. Age 1=10-14 years 2=15-19 years 3= 20 or above (O, D). Here the age gets bigger with each category but the categories are NOT the same size so its ordinal, not interval.
  30. Age: 1=10-14 years 2=15-19 years 3=20-24 years 4=25-29 years (I, D) Here it is measured in exact five year increments making the intervals exactly the same size. Thus it is interval and not ordinal.
  31. Year: (I,D) I think this is another actual interval variable as zero is not a true zero or an absence of years, but simply measures the year Christ was born.
  32. Shade of brown: discrete for sure. But since I did not give you coding on this it could be either nominal or ordinal depending on coding. It is clearly discrete. If you go in order from tan (1) brown (2) dark brown (3) you could argue it's ordinal in that as numbers get bigger it represents "darker shades" or more brown. It could also be nominal if you changed the numbers so they no longer were in an order. I would not make a test problem like this where it is ambiguous.
  33. Money: (R,D) Here I would say the best answer is it is discrete as in US dollars there is nothing in between cents.
  34. UHWO student: Any yes no question is (N,D)
  35. Prison sentences: Any yes no question is (N,D)
  36. Opinions about drugs: (O, D) any attitude question like this where "agreement" grows with the number is ordinal, but not interval. The levels of agreement grow with the numbers but they are not real numbers as 2 is not "twice as much agreement" as 1.
  37. Money: (R,D) Here I would say the best answer is it is discrete as in US dollars there is nothing in between cents.
  38. (R,D) Here I would say the best answer is it is discrete as in US dollars there is nothing in between cents.

39. Any yes no question is (N,D)
40. What costs more? (N,D) clearly the choices are discrete but they are also nominal as the categories are not in a logical ascending order of increasing cost
41. Money: (R,D) Here I would say the best answer is it is discrete as in US dollars there is nothing in between cents.
42. Money: (R,D) Here I would say the best answer is it is discrete as in US dollars there is nothing in between cents.
43. Any yes no question is (N,D)
44. Mark Twain quote (O, D) any attitude question like this where “agreement” grows with the number is ordinal, but not interval. The levels of agreement grow with the numbers but they are not real numbers as 2 is not “twice as much agreement” as 1.
45. How many courses (R, D). No such thing as half a course, so it’s discrete. Ratio because zero is an absence of courses
46. How many courses (R, D). No such thing as half a course, so it’s discrete. Ratio because zero is an absence of courses
47. (O, D) any attitude question like this where “agreement” grows with the number is ordinal, but not interval. The levels of agreement grow with the numbers but they are not real numbers as 2 is not “twice as much agreement” as 1.
48. Any yes no question is (N,D)