

PSYCH 10 Tutorial Session · Fall 2026

Week 3 · The Vault of Fallen Labels · Answer key

Full name (in CAPITAL LETTERS)

SUNet ID (the part before @stanford.edu)

Section (e.g., TUES 9:30)

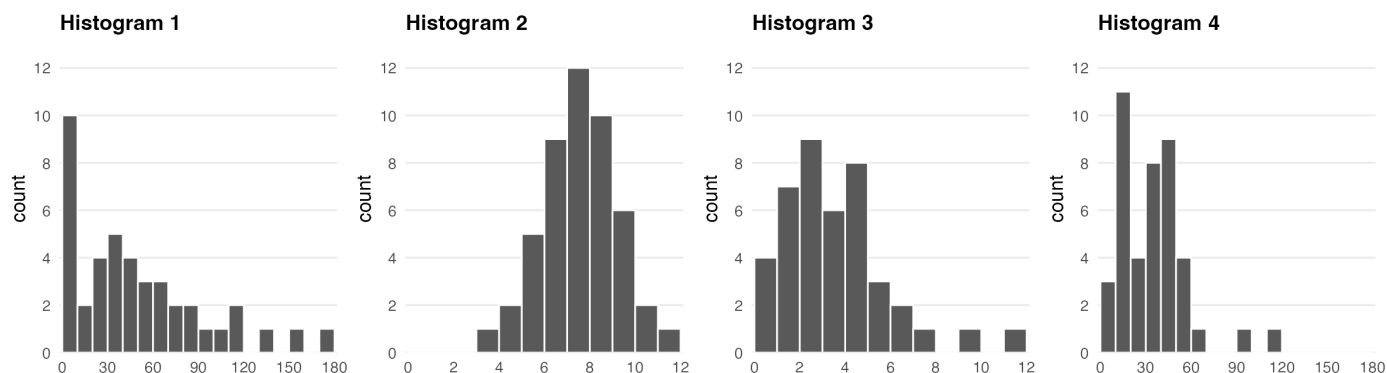
Answer key

Please write legibly, in CAPITAL LETTERS, so the teaching team can log your attendance: if we can't read your name, we can't give you credit.

The situation

Last night a pipe burst in the Data Archive under the Psychology building at **Strangeford University**, where **Archivist Q. Ledger** keeps every dataset ever collected on campus. Jo (on Archive duty since the Sleep Lab Incident) waded in and rescued four histograms from last year's class survey of 42 students. The water washed the axis titles off all four, though the numbers along the axes are still readable. One histogram was so smeared that Q. Ledger redrew it from memory.

The four histograms are drying on the line below, and the four variables they came from are listed under them. Q. Ledger says: **"Match each histogram to its variable, and tell me which one is mine. When you've done that, I have a second job for you."**



The four variables (from last year's class survey of 42 students)

- A** Hours spent studying yesterday **B** Minutes to get to campus this morning
C Hours of sleep last night **D** Minutes on social media yesterday

Part 1: match the histograms to the variables

For each histogram, write the letter of the variable you matched it to, the number of the guideline you used (the four guidelines are on the back of this sheet), and the feature of the histogram you based the match on.

Histogram	Variable	Guideline #	What you saw
1	D	3	The tallest bar is at 0-10 minutes (the people who don't use it, or barely do), followed by a low, ragged hump and a tail that runs out to three hours, which happens with social media and doesn't happen with the trip to campus.
2	C	4	A smooth hill from 3 to 12 hours, centered on 7-8, with no dips anywhere, which is smoother than the histogram of any real sample of 42 people; the range and the shape fit sleep, and the bars add up to 48.
3	A	2	Piles up at 1-5 hours and trails off to the right, with four people at zero, which fits a day's studying and not a night's sleep (nobody slept zero hours).
4	B	3	Two peaks, at 10-20 and 30-50 minutes, with a valley between the two peaks: the people who walk or bike and the people who drive or take the train, with almost nothing past an hour.

Which histogram did Q. Ledger draw from memory, and what gave it away? Did the people around you make the same matches? Where you disagreed, what did you find convincing?

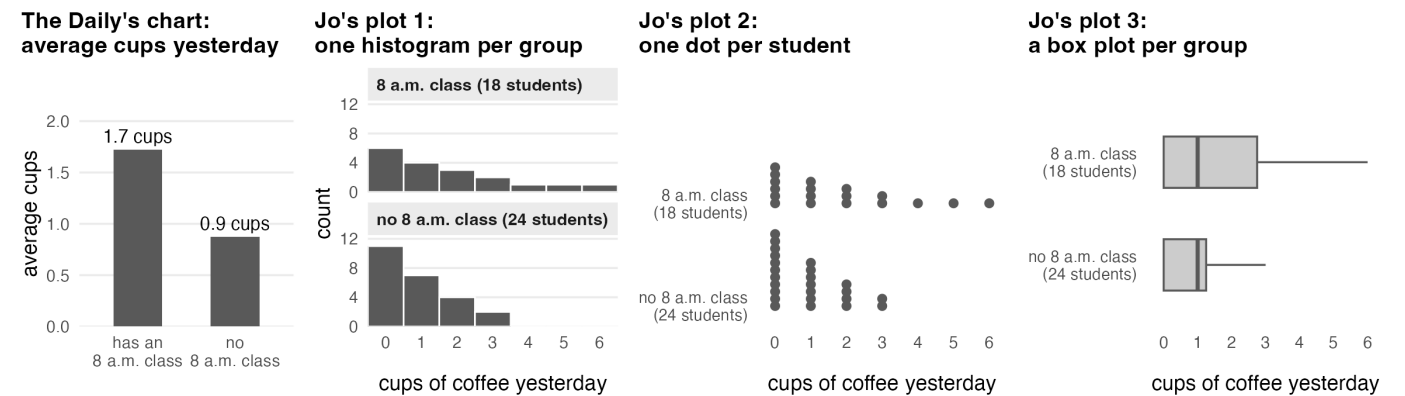
Histogram 2, for two reasons: it is far too smooth for a sample of 42 real people, and its bars add up to 48 when the survey had 42 people in it, so six of the people in that histogram are not real survey respondents. Adding up the bars is the quickest check there is, and the most often skipped step in the whole exercise. (The axes get you as far as the pairs, since 2 and 3 are in hours and 1 and 4 are in minutes, and within each pair the match depends on the shape.)

Four guidelines for matching a histogram to a variable

#	Guideline
1	Possible values. What is the smallest value this variable could take, and what is the largest? Could anyone have a value of exactly zero? Look at where the bars start and where they stop.
2	Shape. Where are most of the people, and is the tail on the left or on the right? Think about what would put most people at one end of the range for this variable.
3	Unusual features. Is there a gap, a second peak, or one bar that is much taller than the bars next to it? Think about whether the way the data were collected could have produced that feature.
4	Roughness. A real sample of 42 people usually makes an uneven histogram. If one of these looks very smooth, ask how it could have ended up that way.

Part 2: the Daily's chart

Ari Byline, who reports on data for the *Strangeford Daily*, was in the Archive when the pipe burst. Ari was copying two columns from the same class survey: how many cups of coffee each of the 42 students drank yesterday, and whether they have a class at 8 a.m. (18 do, 24 don't). From those two columns Ari made the chart below and wrote the headline **"8 a.m. classes double coffee intake."** The *Daily* goes to print at 3 p.m. Q. Ledger doesn't trust the headline and has had Jo plot the same two columns three other ways. **"The difference between those two averages comes from a few students. Find them in Jo's plots, and then tell me which plot I should send the *Daily* instead."**



1. Find them. How many students are responsible for the difference between the two averages, and how much coffee did each of them drink?

Three students, all of them in the 8 a.m. group, at 4, 5, and 6 cups; if you take them out, the two averages are 1.1 and 0.9 cups. You can see them as three dots in Jo's dot plot and as three one-person bars in Jo's histograms, they are hidden inside the long whisker in the box plots, and in the Daily's chart they are invisible.

2. What each plot shows. For each of Jo's three plots, write one thing you can see in it about these 42 students that you can't see as easily in any of the other plots on this page. Then circle the plot you would send the *Daily* in place of its chart.

Jo's plot 1	How many students are at each number of cups in each group, so that the pile at zero is a count you can read off (6 and 11) and the two shapes can be compared on one axis.
Jo's plot 2	Every single student, so that you can point at the three heavy drinkers and at the 17 students at zero cups.
Jo's plot 3	The middle of each group and its middle half, which shows that both medians are 1 cup and that the 8 a.m. group is more spread out, while hiding the pile at zero and the three individuals.

Which to send: any of Jo's three plots is a good choice as long as the reason says what that plot shows (and, best of all, the information that plot hides from the reader). Q. Ledger sends the dot plot, because every student is visible in it and the three heavy drinkers are visibly three people, whereas the Daily's chart shows the two averages and nothing else.

3. The headline. The Daily's headline says that students with an 8 a.m. class drink twice as much coffee as students without one. That is true of the two averages. Is it an accurate description of the students themselves, given what you found in question 1? Write a headline that describes what the survey shows about these 42 students.

The two averages really are 1.7 and 0.9 cups, so the headline isn't false, but it describes three people rather than the two groups, because the typical student in both groups drank one cup and 17 of the 42 drank no coffee at all. A headline that describes the 42 students would be something like "Most students drink little coffee, with or without an 8 a.m. class," or "A few 8 a.m. students drink a lot of coffee; most drink none or one cup."

4. The reason. The headline says that having an 8 a.m. class made these students drink more coffee. But the students were not sorted into the two groups at random; they chose their own classes, so the two groups could differ in other ways as well. Name two processes, other than the class itself, that could have produced the difference in coffee drinking.

Any two of these would be a good answer. The direction could run the other way, with people who already drink a lot of coffee being the ones who sign up for 8 a.m. classes in the first place; a third thing could produce both, such as a sport with 6 a.m. practice, a morning job, a long commute, or a major with a required course at 8; the difference could be chance, since it comes down to three people and another 42 students could easily have put them in the other group; or it could be measurement, since the cups are self-reported and one person's cup may be a large mug. The only way to tell these apart would be to assign students to 8 a.m. classes at random, which nobody can do with a class schedule, and that is why the Daily can't print "double" as a cause.