Date 10-26-2026

Full name (in CAPITAL LETTERS) _____ **SUNet ID** (the part before @stanford.edu) _____ **Section** (e.g., TUES 9:30) _____

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

PSYCH 10 · Fall 2026 · Worksheet for Lecture 10: Linear regression

Work through these with the people sitting next to you; the teaching team will be walking around to help. Credit is for a good-faith effort, not for right answers. Hand it in before you leave.

Part 1 · The cost of a parameter

Eight students, four walkers and four shuttle riders, one mean per group: **SS Model = 72, SS Error = 36, SS Total = 108.** Fill in the table on your sheet as you go.

a. Fill in the df column: df Model, df Error, and df Total. (The empty model spends one of the eight degrees of freedom; the two-group model spends one more.)

b. Fill in the MS column: MS Model and MS Error, each SS divided by its df.

c. Compute F = MS Model / MS Error and write it in the Model row.

	SS	df	MS	F
Model (walked or took the shuttle)	72			
Error	36			
Total	108			

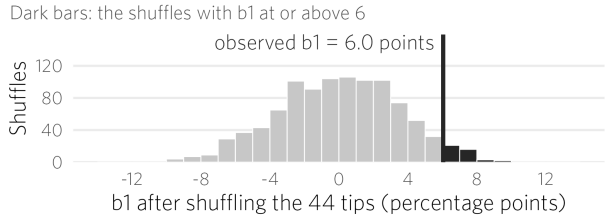
d. Now suppose each of the eight students is in a group of their own, so the model has eight means. Write that model's SS Error, PRE, and df Error, one number each.

e. A ninth student from the same section is about to report a commute time. Which model gives a usable prediction for that student: the two-group model or the eight-group model? Write your choice, and one sentence giving your reason.

d. SS Error = _____ PRE = _____ df Error = _____

e. _____

Part 2 · Could the difference be chance?



In 1996 a server drew a smiley face on the checks of 22 tables chosen at random out of 44, and left the other 22 plain. Smiley-face tables tipped 33% of the bill on average and plain-check tables 27%, so b_1 = 6 percentage points. The histogram shows b_1 for 1,000 shuffles of the 44 tips across the two groups.

a. Add the heights of the bars to the right of the line: in about how many of the 1,000 shuffles was b_1 at least 6? Write a whole number.

b. If the smiley face had no effect, in about how many of every 100 shuffles would a difference of 6 points or more arise?

c. If the smiley face had no effect, would a difference of 6 points or more be common or rare? Write *common* or *rare*, and one sentence giving your reason, using your answer to b.

a. _____ b. _____

c. _____

Part 3 · The slope and the intercept



The figure shows the heights of 1,487 children aged 2 to 12 from the NHANES health survey, with the regression line of height on age. Rounded to simple numbers, the line is **height = 32 + 2.5 x age**, with height in inches and age in years.

a. Compute the line's predicted height for a 4-year-old and for an 8-year-old, in inches.

b. An 8-year-old in the survey is 49 inches tall. Compute this child's residual, in inches, with its sign.

c. In one sentence: is this child taller or shorter than the line predicts, and by how many inches?

d. The oldest children in these data are 12. Compute the line's predicted height for a 24-year-old, in inches.

e. Is that prediction trustworthy? Write *yes* or *no*, and one sentence giving your reason.

a. 4-year-old: _____ in 8-year-old: _____ in b. residual: _____ in

c. _____

_____

d. _____

e. _____

_____

_____

Something new you learned today: _____