LESSON MAKER PRO

Fit the Trend

Turn regression output into a line of best fit.

HIGH SCHOOL · GDA.DSP.D.12.b

GDA.DSP.D.12.b "Use technology to find the least-squares line of best fit for two quantitative variables."

NAME _____ DATE _____

FROM OUTPUT TO EQUATION

A regression tool can report mean x, mean y, S_{xx}, and S_{xy}. Use $m = S_{xy}/S_{xx}$ and b = mean y - m(mean x), then write the least-squares line as y = mx + b.

WORKED EXAMPLE

Use the regression tool's output to find the least-squares line.

REGRESSION OUTPUT

mean x	mean y	Sxx	Sxy
11	31	16	48

1. m = 48/16 = 3
2. b = 31 - 3(11) = -2

Answer: y = 3x - 2

PRACTICE 4 problems

1 Tool output: mean x = 2, mean y = 7, S_{xx} = 4, S_{xy} = 8. Find the line.

ANSWER _____

2 Tool output: mean x = 4, mean y = 6, S_{xx} = 6, S_{xy} = -6. Find the line.

ANSWER _____

3 Tool output: mean x = 6, mean y = 9, S_{xx} = 8, S_{xy} = 4. Find the line.

ANSWER _____

4 Tool output: mean x = 3, mean y = 5, S_{xx} = 10, S_{xy} = 15. Find the line.

ANSWER _____

APPLY IT Show your work

1 A student tracks hours spent editing videos (x) and clips finished (y). Use the app output to find the line and predict the number of clips finished in 6 hours.

REGRESSION APP OUTPUT

mean x	mean y	Sxx	Sxy
4	10	10	20

ANSWER _____

2 A player tracks practice sessions (x) and free throws made out of 20 (y). Use the app output to find the line and predict free throws made after 5 sessions.

REGRESSION APP OUTPUT

mean x	mean y	Sxx	Sxy
3	12	8	8

ANSWER _____

CHALLENGE One step up

For these data, an app reports mean x = 5/2, mean y = 5, $S_{xx} = 5$, $S_{yy} = 26$, and $S_{xy} = 11$. Find both regression lines, y on x and x on y. Are their slopes reciprocals?

PAIRED DATA

x	y
1	2
2	4
3	5
4	9

WORK SPACE AND ANSWER

Fit the Trend

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Tool output: mean x = 2, mean y = 7, S_{xx} = 4, S_{xy} = 8. Find the line.	**y = 2x + 3**
2	Tool output: mean x = 4, mean y = 6, S_{xx} = 6, S_{xy} = -6. Find the line.	**y = -x + 10**
3	Tool output: mean x = 6, mean y = 9, S_{xx} = 8, S_{xy} = 4. Find the line.	**y = (1/2)x + 6**
4	Tool output: mean x = 3, mean y = 5, S_{xx} = 10, S_{xy} = 15. Find the line.	**y = (3/2)x + 1/2**

PART 2 · APPLY IT

1. **y = 2x + 2; 14 clips** The slope is 20/10 = 2, and the intercept is 10 - 2(4) = 2. At x = 6, the prediction is 14.
2. **y = x + 9; 14 free throws** The slope is 8/8 = 1, and the intercept is 12 - 1(3) = 9. At x = 5, the prediction is 14.

CHALLENGE

y = (11/5)x - 1/2; x = (11/26)y + 5/13. No. The reciprocal of 11/5 is 5/11, not 11/26.

Accept equivalent forms of each equation. For the challenge, the two regressions use different denominators: S_{xx} and S_{yy}.