

Day 1 Problem Set

Methods Camp | University of Texas at Austin

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Day 1 Problem Set

This problem set contains exercises from Day 1 that were originally done in small groups. To reinforce your understanding, please complete these exercises independently.

Exercise 1: Functions and Operations

1.1 Let $f(x) = 5x - 4$. Compute $f(2)$ and $f(0)$.

1.2 Let $f(x, y) = 3x + y^2$. Compute $f(2, 3)$.

1.3 Simplify: $\ln(50) - \ln(10)$. (Hint: use a log rule.)

1.4 Solve for x : $\ln(x) = 2$. (Hint: rewrite in exponential form.)

1.5 A class survey of 6 students records number of siblings: $\{1, 0, 2, 3, 1, 2\}$.

a. Write the total number of siblings using summation notation and calculate it.

b. Compute the mean $\bar{x}$.

Exercise 2: Ratios, Proportions, Rates & Percentages

A town has 5,400 women and 4,600 men.

2.1 Compute the sex ratio (males per 100 females).

2.2 Compute the proportion of the town that is female.

2.3 Last year the town recorded 27 burglaries. Compute the burglary rate per 100,000 residents. (Total population = 10,000.)

2.4 The town's unemployment rate fell from 8% to 6%.

a. What is the change in percentage points?

b. What is the percent (relative) change?

2.5 A city's child poverty rate falls from 20% to 15%. An abstract reads: "Poverty drops 5%." Is this headline accurate? Why or why not?

Exercise 3: Logarithms and Income

A researcher studies how income relates to years of education (X), using a model of log income:

$$\ln(Y) = 9.00 + 0.08X$$

where Y is annual income in dollars.

- 3.1 For a respondent with $X = 12$ years of education, compute $\ln(Y)$.
- 3.2 Convert $\ln(Y)$ into Y (dollars) by exponentiating. (Hint: use the inverse of $\ln$.)
- 3.3 Now consider a respondent with 13 years of education. Compute their income.
- 3.4 The exponentiated coefficient on X is $e^{0.08} \approx 1.083$. Interpret this number in one sentence.