

Name:

## APPLICATION: Representing Data on Student Loans, Housing, and High-Cost Lenders

### Level 1

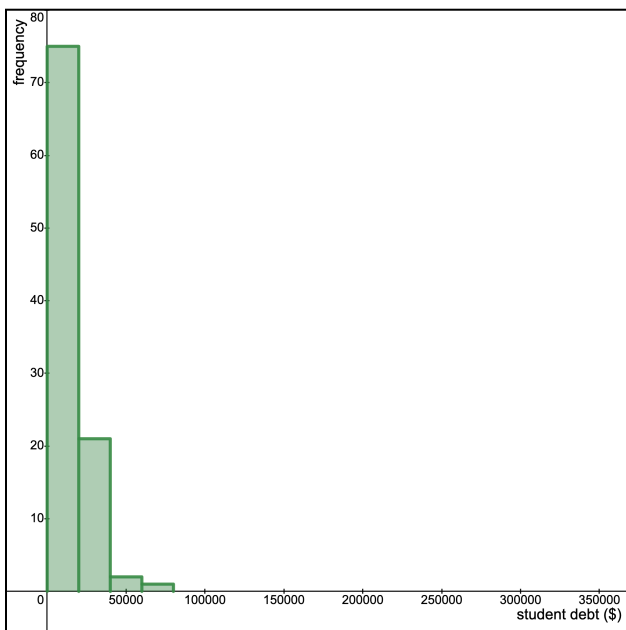
#### Federal Student Loan Balance by Age

Let's use histograms to analyze student loan balances for different age groups.

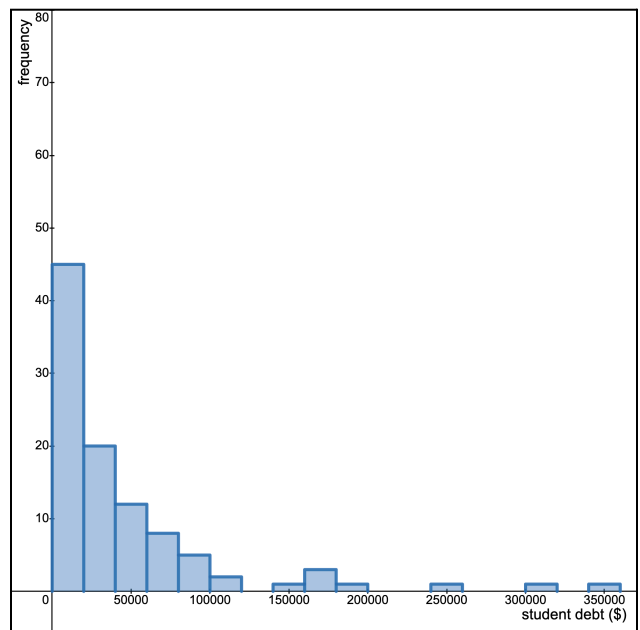
The histograms below show the student loan balances of borrowers under 25 and borrowers aged 35-49.

Both histograms pull a representative sample of 100 borrowers using data from [Federal Student Aid](#).

**Student Debt for Borrowers <25 Years Old**



**Student Debt for Borrowers 35-49 Years Old**



- Summarize: How does student loan debt compare for borrowers aged 35-49 and borrowers below 25?**
- For each of the following statements, respond true, false, or can't be determined. Then, write one sentence using math vocabulary and/or numbers to support your response.**
  - The median student debt is higher for borrowers aged 35-49 than borrowers under 25.
  - The standard deviation of student debt for borrowers under 25 is higher than the standard deviation of student debt for borrowers aged 35-49.

- c. There was one borrower aged 35-49 with a loan balance of exactly \$300,000.
- d. For borrowers aged 35 - 49, the mean loan balance is greater than the median loan balance.

**3. Make an inference: Why is the mean student debt higher for borrowers aged 34-49 year olds than for borrowers under 25?**

**4. Challenge: Write your own statement about the data sets and identify it as true, false, or unanswerable.**

## Level 2

### Part 1: Representing and Comparing Housing Costs

Let's use data analysis to look at the cost of housing in different states. We're going to compare the monthly costs of renting and owning a home in Michigan and California, using a representative sample from the US Census' 2020 [American Community Survey](#).

#### ACTIVITY: Card Sort: Histograms and Box Plots

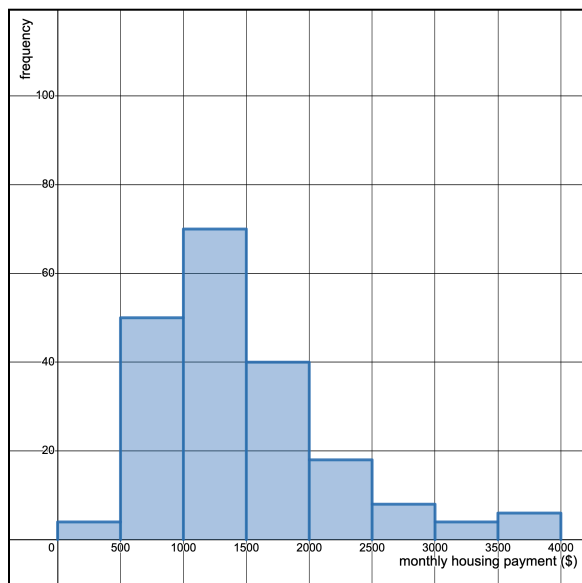
1. Match each histogram to the corresponding box plot. Record two of your matches below and write one sentence explaining your reasoning using numbers and/or math vocabulary.

a. Histogram \_\_\_\_\_ matches with boxplot \_\_\_\_\_.  
Explanation:

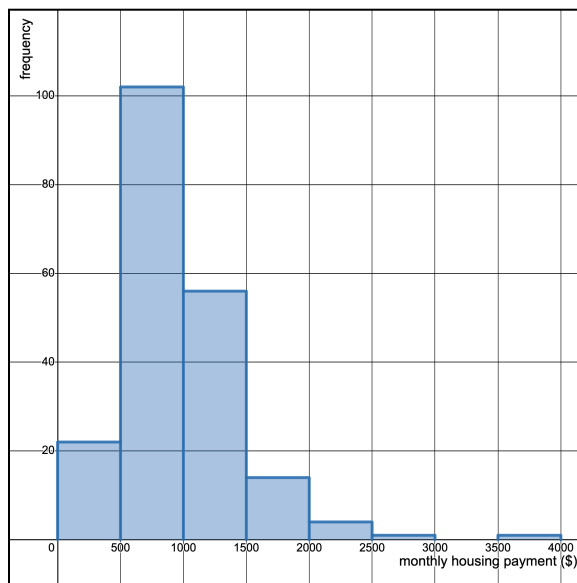
b. Histogram \_\_\_\_\_ matches with boxplot \_\_\_\_\_.  
Explanation:

Two of the histograms from the Card Sort are shown below. They represent the distribution of monthly mortgage costs in Michigan, compared to monthly rent costs in Michigan.

**Michigan mortgages**



**Michigan rents**



2. For each of the following statements, respond true, false, or can't be determined. Then, write one sentence using math vocabulary and/or numbers to support your response.

a. The average (mean) mortgage is higher than the median mortgage in Michigan.

- b. The standard deviation of Michigan mortgages is higher than the standard deviation of Michigan rents.
- c. There were 50 people surveyed with a monthly mortgage payment of \$750.
- d. The median Michigan rent is between \$500 and \$1000.
- e. The median rent is higher than the median mortgage in Michigan.

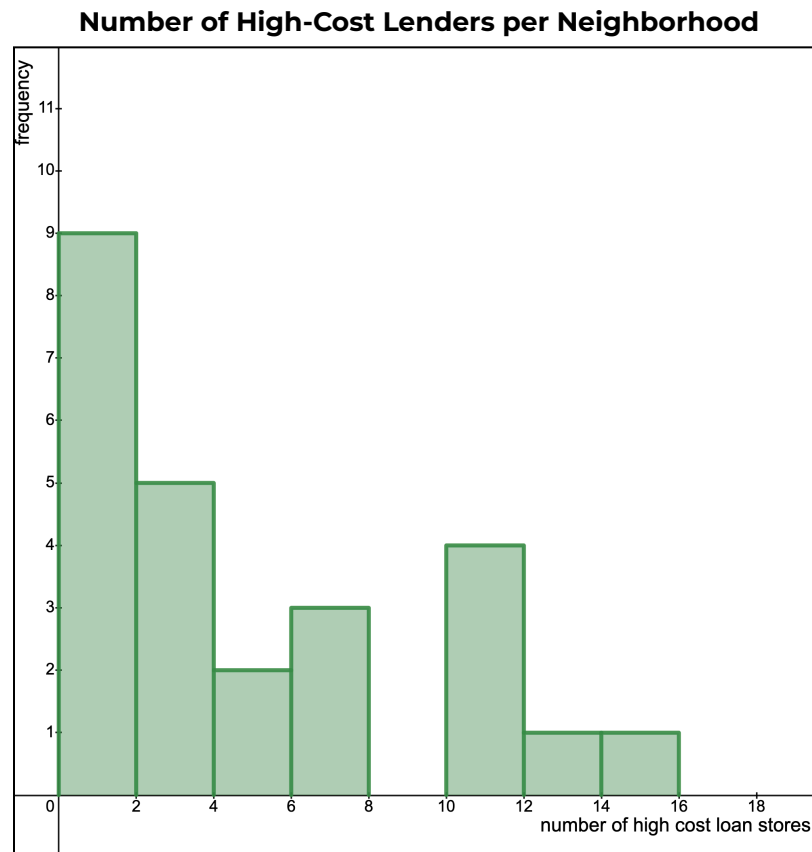
**5. Challenge: Write your own statement about the data sets and identify it as true, false, or unanswerable.**

## Level 3

### High Cost Loans

Payday loans, car title loans, and flex loans are high-cost loans that can trap consumers in debt with effective interest rates as high as 500% APR. Research indicates that high-cost loans are often targeted at communities of color, low-income communities, and people with limited access to other lines of credit.

Let's examine a case study about the city of Memphis, using data on 25 neighborhoods (defined by zip codes) from the [Hope Policy Institute and Black Clergy Collaborative of Memphis](#).



1. **Estimate:** what is the median number of high-cost lenders in a Memphis neighborhood?
2. **Describe** the distribution of the data. Make one observation about high-cost lenders in Memphis

- First, create a histogram of the median earnings in neighborhoods with  $\leq 2$  high-cost lenders
- Next, create a histogram of the median earnings in neighborhoods with  $> 2$  high-cost lenders

| Zip code   | # of high-cost loan stores | Median earnings |
|------------|----------------------------|-----------------|
| 38139      | 0                          | \$74,282        |
| 38138      | 0                          | \$61,263        |
| 38135      | 0                          | \$40,035        |
| 38107      | 0                          | \$27,222        |
| 38105      | 0                          | \$26,555        |
| 38108      | 0                          | \$21,341        |
| 38103      | 1                          | \$53,786        |
| 38106      | 1                          | \$24,384        |
| 38126      | 1                          | \$14,222        |
| 38117      | 2                          | \$44,298        |
| 38112      | 2                          | \$28,504        |
| 38125      | 3                          | \$36,322        |
| 38133      | 3                          | \$41,753        |
| 38141      | 3                          | \$32,414        |
| 38114      | 4                          | \$20,797        |
| 38127      | 5                          | \$23,704        |
| 38134      | 6                          | \$28,873        |
| 38104      | 6                          | \$37,063        |
| 38109      | 6                          | \$24,333        |
| 38111      | 11                         | \$27,690        |
| 38122      | 11                         | \$30,452        |
| 38128      | 11                         | \$27,185        |
| 38118      | 11                         | \$22,967        |
| 38115      | 12                         | \$26,524        |
| 38116      | 15                         | \$26,861        |
| City total | 114                        | \$29,776        |

[illegible][illegible]

- 4. Write a paragraph summarizing your findings. How do the two histograms compare? What does that tell you about high-cost lending in Memphis?**

In your response, make sure to...

- Include a topic sentence summarizing how the two histograms compare
- Describe a specific measure of center (ie. mean or median of the data)
- Use relevant vocabulary to describe the distribution (ie. the shape or standard deviation)
- Support your reasoning with specific numeric values

- 5. Ellis calculates that the median of the provided incomes for all 25 neighborhoods is \$27,690. Why is the median they found different than the median given for the city of Memphis?**