Student house costing

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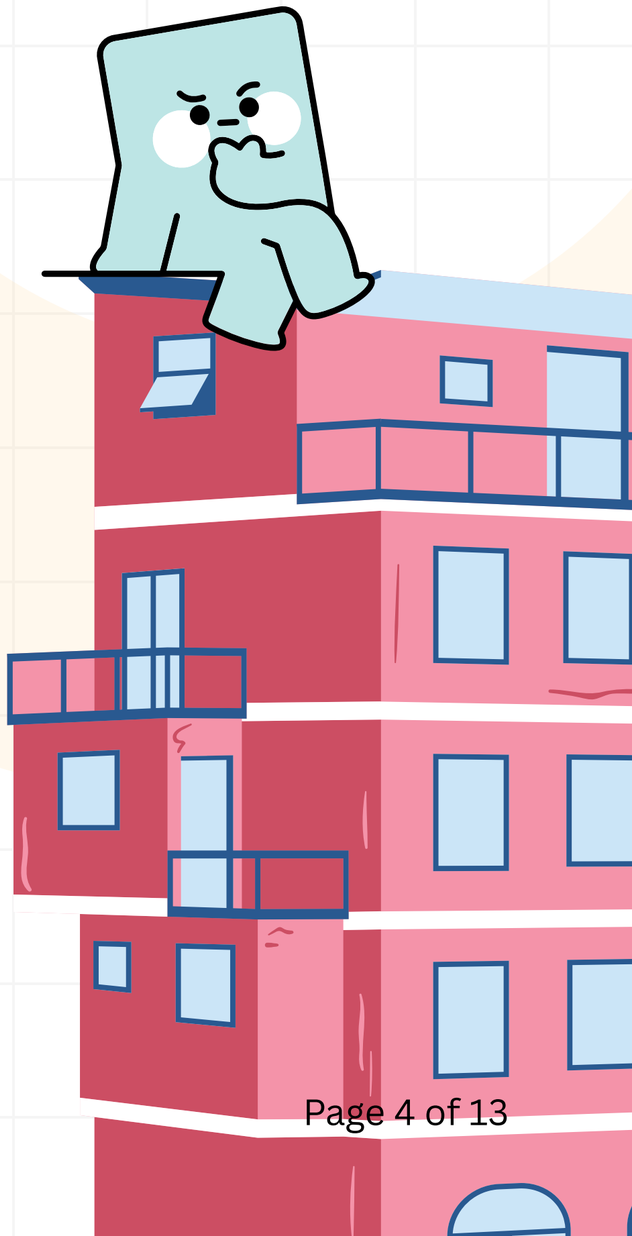
Table of contents

Introduction

Students often wonder whether their housing cost is typical?

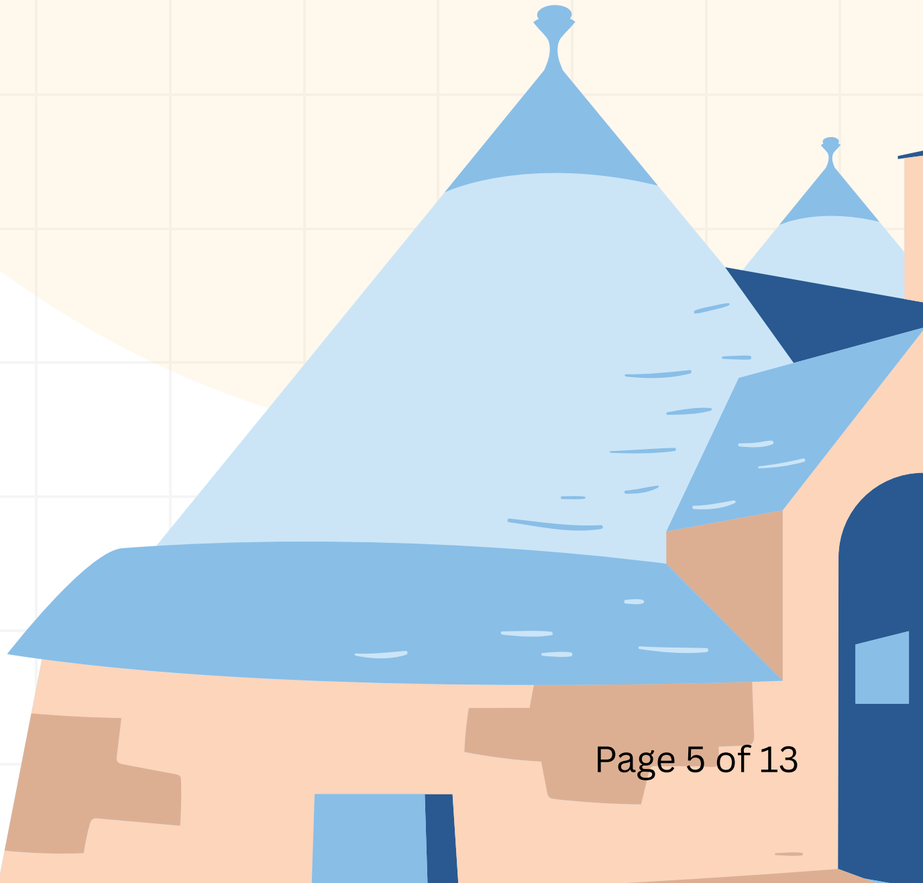
Student housing cost is a major and unavoidable expense for university students that directly affects their financial well-being. Housing costs vary widely, making this an important real-life issue.



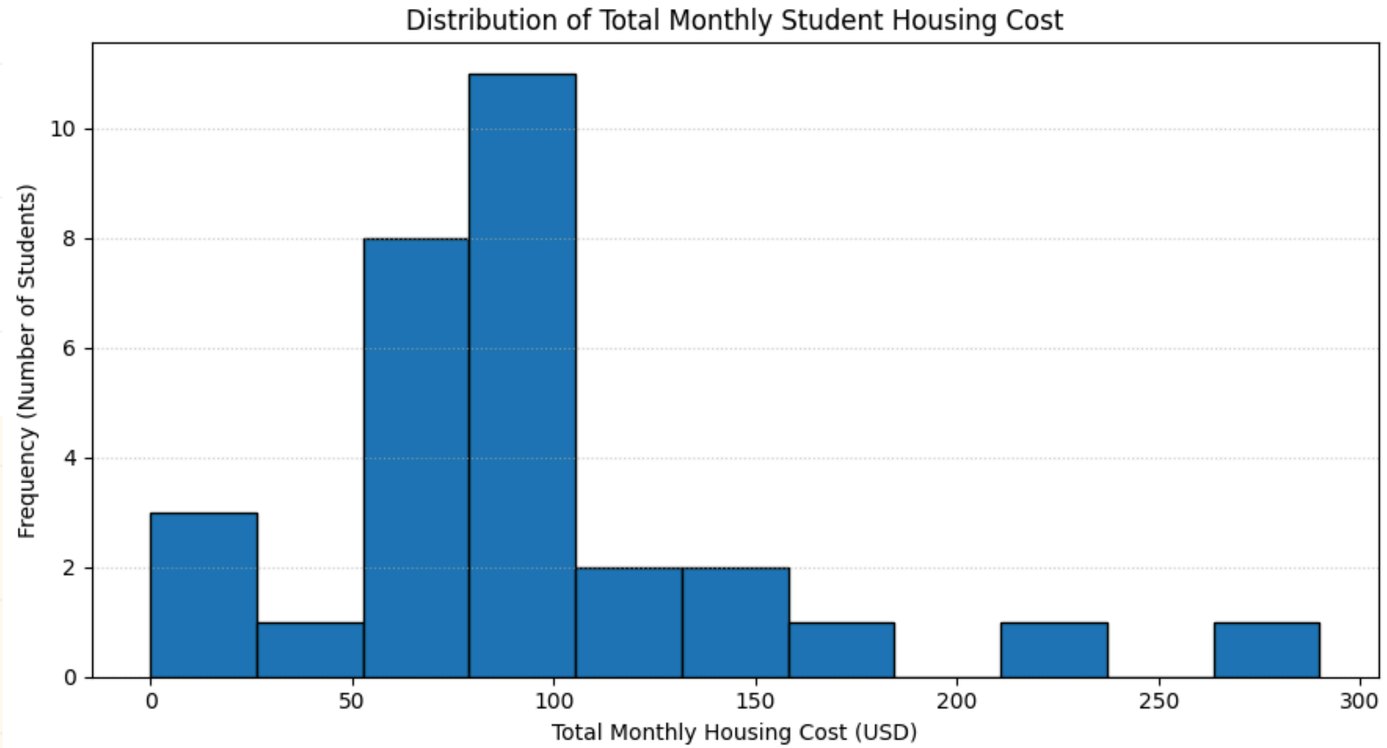
Dataset

No.	Ages	Housing_Cost	No.	Ages	Housing_Cost
1	20	68	16	20	90
2	19	24	17	20	0
3	20	56	18	19	290
4	20	150	19	19	115
5	20	53.5	20	20	63.25
6	21	152.5	21	19	222.5
7	20	87	22	20	95
8	19	114.5	23	20	95
9	20	98	24	19	180
10	20	55.5	25	18	105
11	20	60	26	19	90
12	20	68	27	20	84.5
13	20	61	28	18	30.5
14	20	95	29	18	95
15	19	25	30	19	85

HOUSING COST = HOUSE RENT + WATER + ELETRICITY



DESCRIPTIVE STATISTICS



SAMPLE MEAN: 93.62 USD

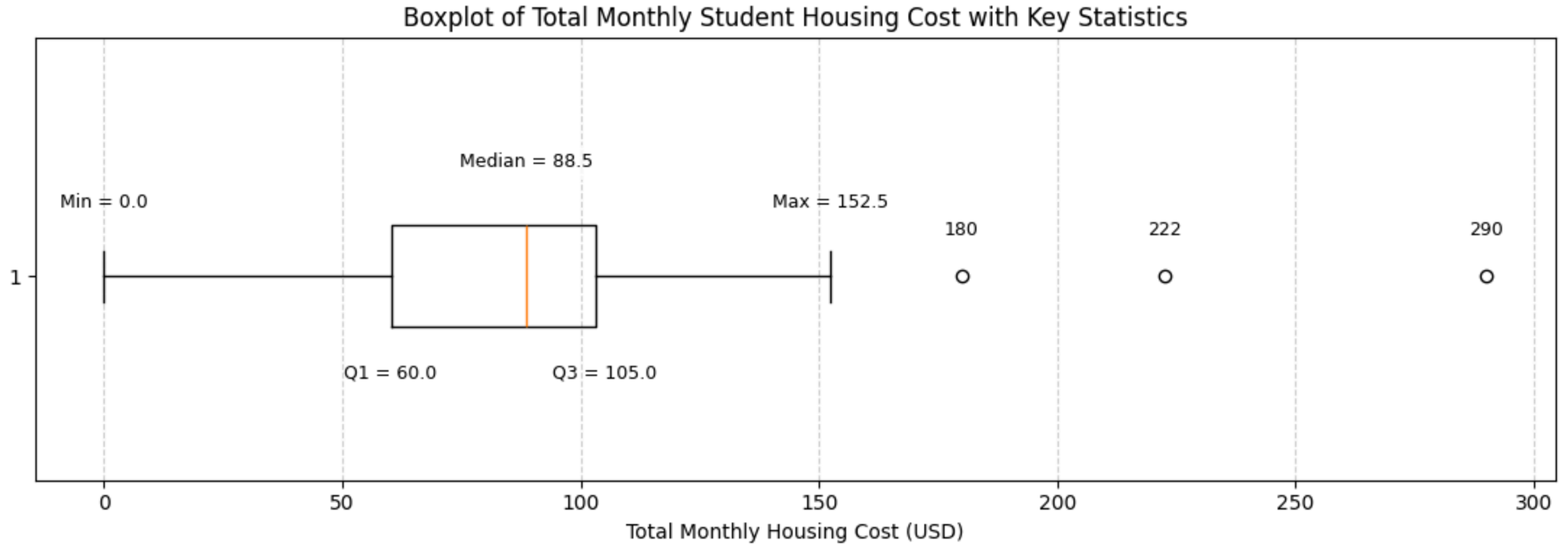
SAMPLE VARIANCE: 3509.35

MEDIAN : 88.5 USD

SAMPLE STANDARD DEVIATION: 59.24 USD

RANGE : 290.00 USD

MODE : 95.00 USD



Q1: 60.00 USD

Q3: 105.00 USD

MEDIAN: 88.5 USD

IQR: 45.00 USD

MIN : 0.00 USD

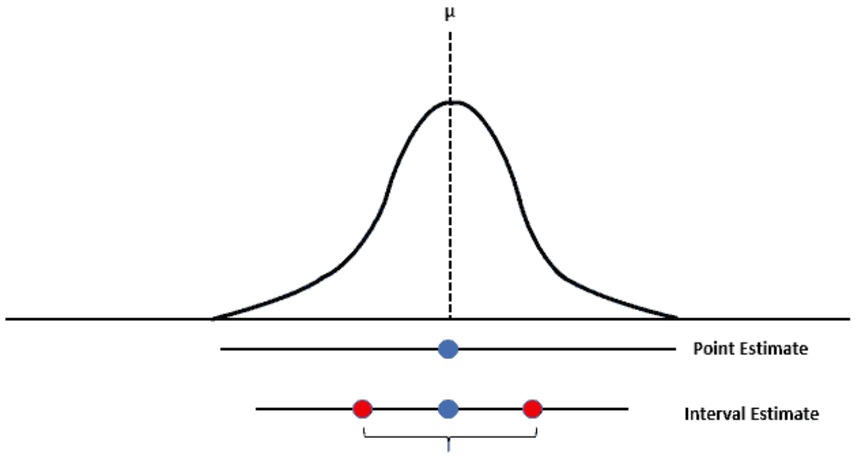
MAX : 152.5 USD

OUTLIER: 180 USD, 222 USD, 290 USD

Point Estimation

Parameters and Estimators

- an unknown mean μ
- an unknown variance σ^2



Sample Mean

$$\bar{X} = \frac{1}{n}\sum_{i=1}^{n} X_i$$

$$\bar{X} = 93.62 \text{ USD}$$

Sample Variance

$$S^2 = \frac{1}{n-1}\sum_{i=1}^{n}(X_i - \bar{X})^2$$

$$S^2 \approx 3509.35 \text{ USD}^2$$

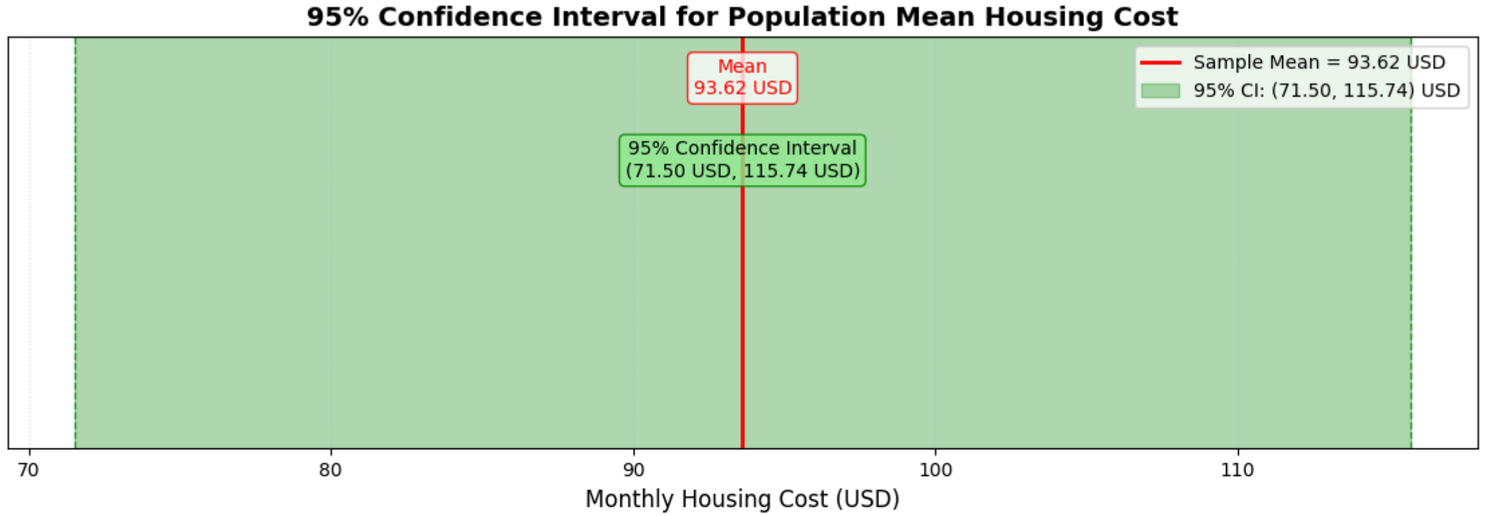
- **Unbiasedness:**
  $\bar{X}$ is unbiased because $E(\bar{X}) = \mu$.
- **Consistency:**
  As n increases, $\bar{X}$ converges to μ.

Standard Error of the Mean $SE(\bar{X}) = \frac{s}{\sqrt{n}} = \frac{59.24}{\sqrt{30}} \approx 10.82 \text{ USD}$

Confident Interval

95% Confidence Interval for μ

- $\bar{x} = 93.62$
- $s = 59.24$
- $n = 30$
- $t_{0.025,29} \approx 2.045$ (from t-table)



$$\bar{X} \pm t_{0.025,29} \cdot \frac{s}{\sqrt{n}} = 93.62 \pm 2.045(10.82) = (71.48,\ 115.76)\ \text{USD}$$

Confident Interval

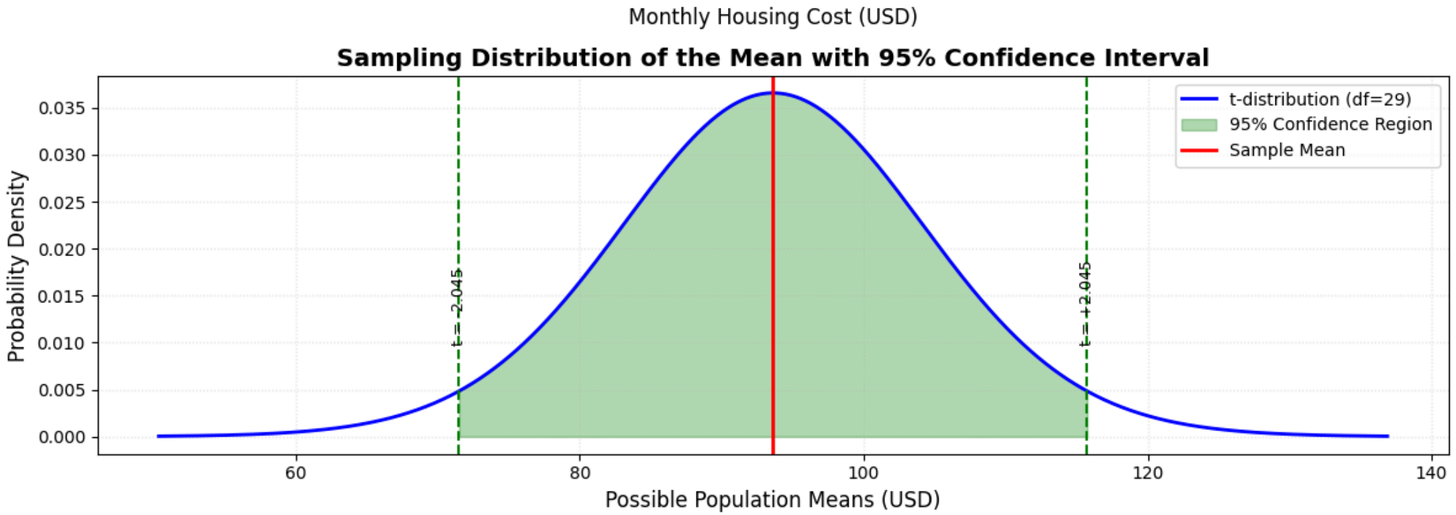
Required Sample Size (95% Confidence, Margin of Error = 0.5 USD)

Desired margin of error: $E = 0.5$ USD

Confidence level: 95% → $z_{0.025} = 1.96$

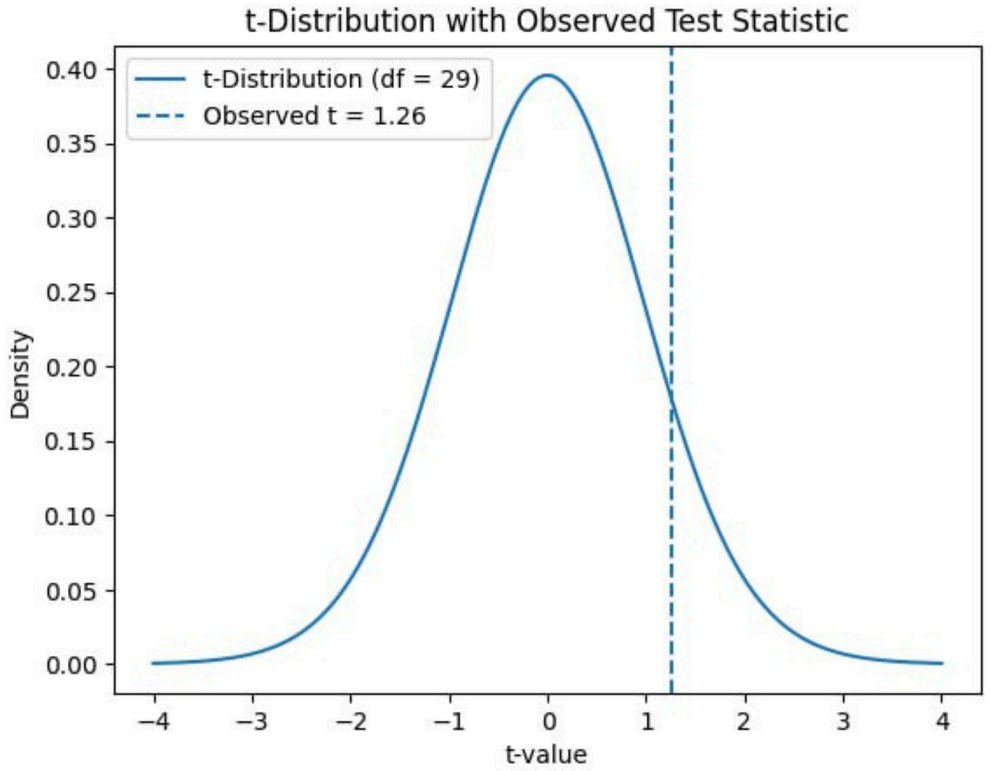
Estimated standard deviation: $\sigma \approx s = 61.73$ USD

$$n = \left(\frac{1.96 \times 59.24}{0.5} \right)^2 \approx 53,927$$



A very large sample is required because housing costs have high variability.

Hypothesis Testing



Hypotheses

H_0: μ = 80 USD

H_a: μ ≠ 80 USD (two-tailed test)

Test Used

population standard deviation is ununknown

One-sample t-test

α = 0.05, n = 30

Test Statistic

Sample mean: 93.62 USD

Standard deviation: 59.24 USD

t = 1.26

p-value

p ≈ 0.22

Decision

p > 0.05 → Fail to reject H_0

Conclusion

Main Findings

Mean housing cost: 93.62 USD

High variability among students

Limitations

Small sample size (n = 30)

Self-reported data

Limited geographic scope

Hypothesis Testing Result

No significant difference from 80 USD

p-value = 0.22

Future Study

Larger sample size

Analyze rent, water, electricity separately

Compare different housing types

Thank you