Commute Time for Century Teachers

Hypothesis

- We believe that the average commute time for teachers at Century is 30 min

Data Collection

- Sampling technique used, and describe briefly about the sampling process

- Any possible bias and measure to limit them

- Example: We will collect data by using the random sampling method. We assign teachers at Century a number from 1 to 92, using random number table to survey 51 professors.

Data

- Length of commute (in minutes)
- 35, 10, 40, 18, 45, 45, 35, 12, 30, 14, 22, 28, 20, 18, 10, 30, 18, 12, 30, 12, 21, 20, 60, 15, 20, 23, 35, 17, 23, 20, 7, 25, 17, 10, 30, 25, 45, 11, 12, 30, 25, 5, 18, 17, 60, 25, 150, 20, 40, 14, 30
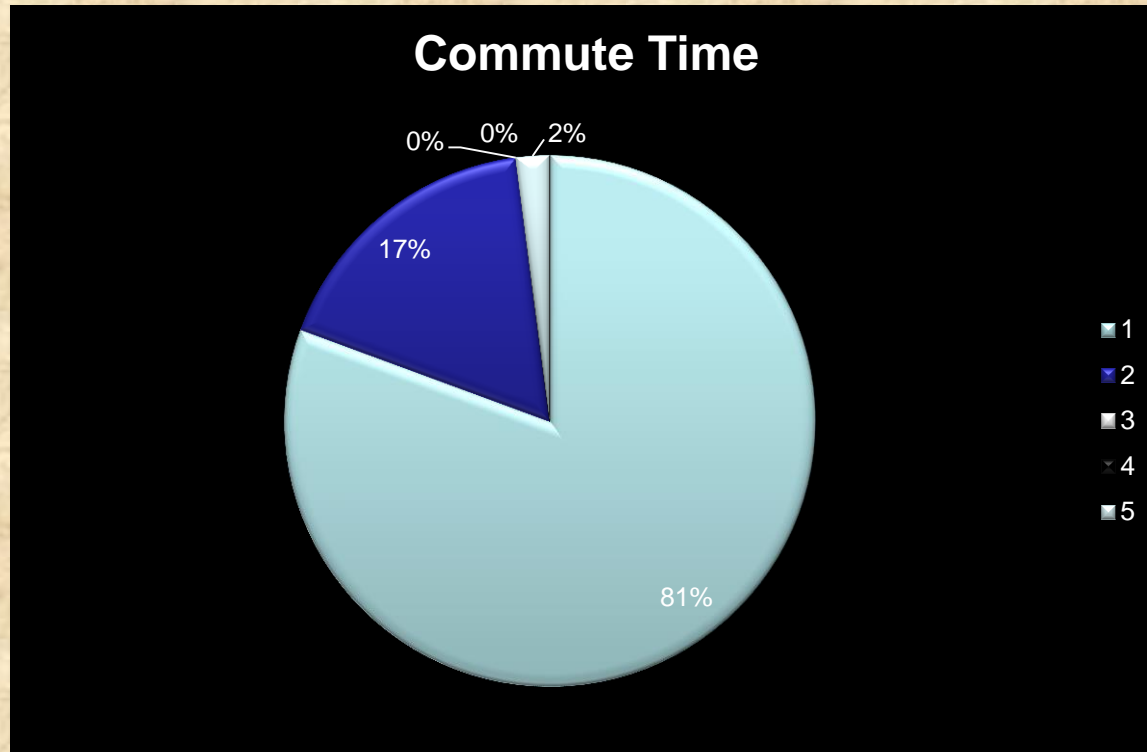
Frequency Distribution Table

Class	Frequency	Mid-Point	Relative Frequency	Cumulative Frequency
5-33	40	19	0.7843	40
34-62	10	48	0.1961	50
63-91	0	77	0	50
92-120	0	106	0	50
121-150	1	125	0.0196	51

Histogram

- At least 5 classes

Pie Chart

Commute Time

- 0%
- 0%
- 2%
- 17%
- 81%

Legend: 1, 2, 3, 4, 5
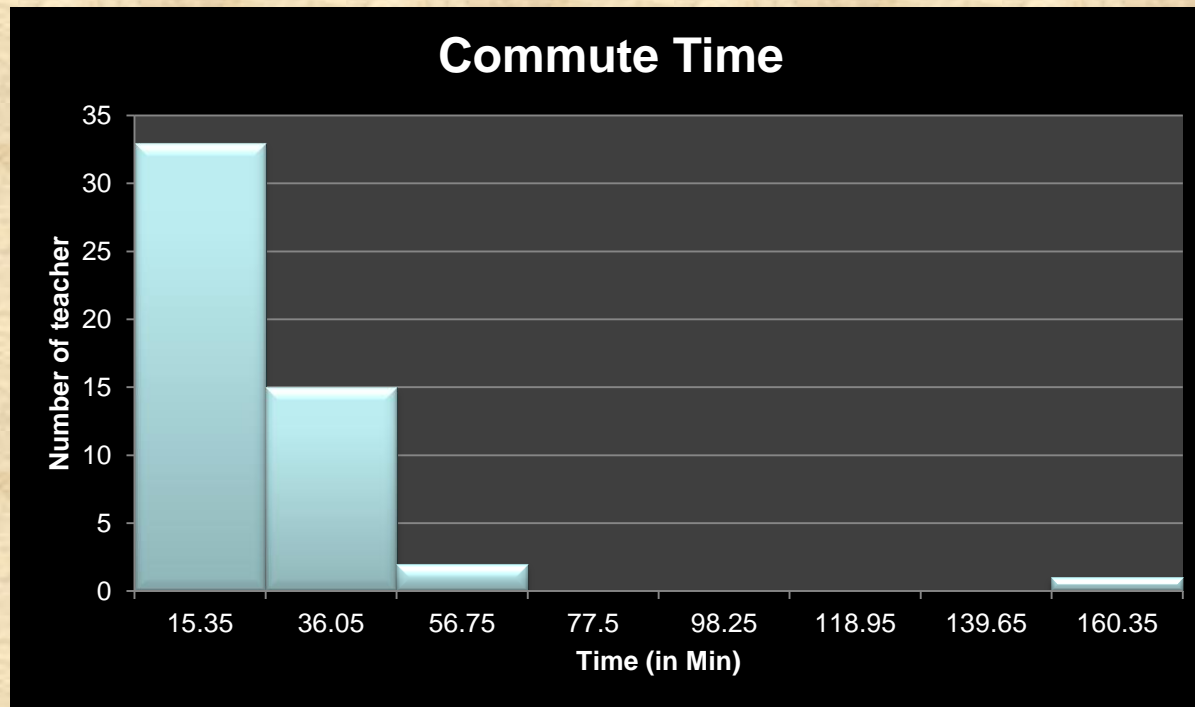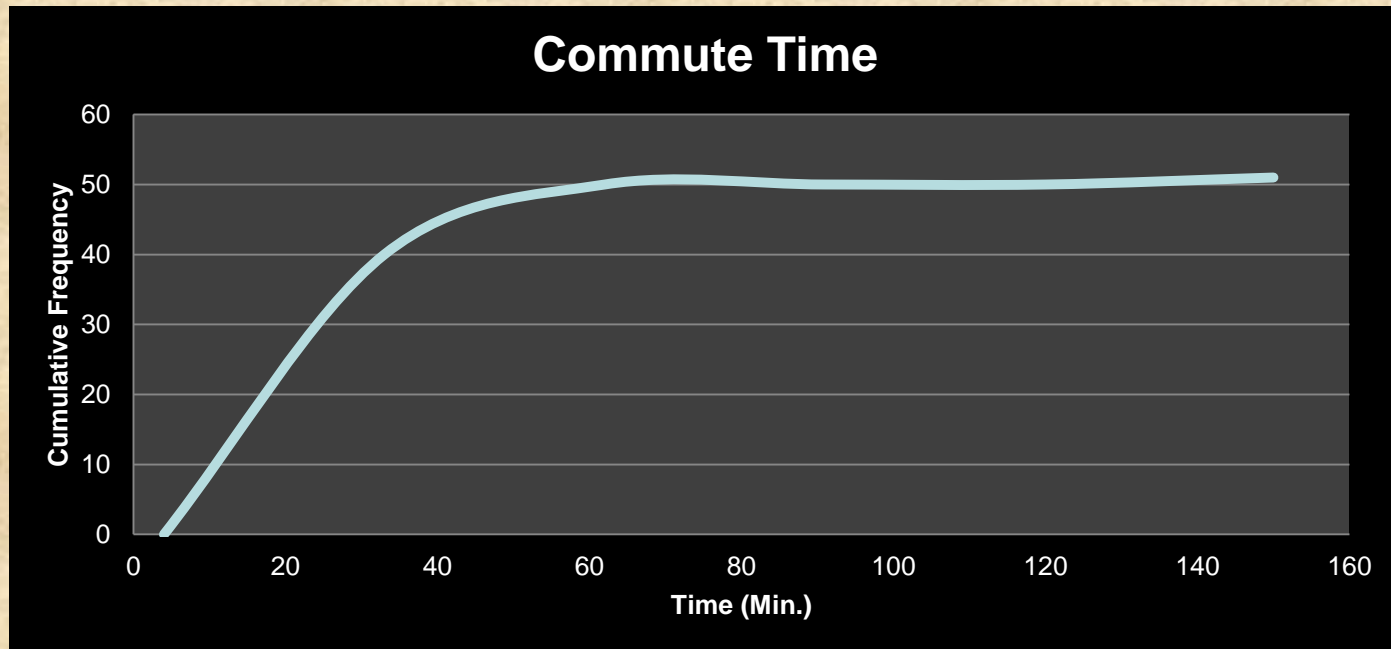
Ogive

Statistics

- From our survey, teachers' sample commute mean time is 26.6 minutes with sample standard deviation 21.6 min.

$$\bar{x} = \frac{35 + 10 + 40 + ... + 30}{51} \approx 26.6$$

$$s = 21.6$$

5 Number Summery

- Min: 5
- Q1: 15
- Q2: 21
- Q3: 30
- Max: 150
- LF: 15 – 1.5 (30-15) = -7.5
- UF: 30 +1.5 (30-15) = 52.5
- There are three outliers in the data: 60, 60, 150

Confidence Interval

- **95% Confidence Interval**
- t-Interval
- We are 95% confident mean commute time for all the teachers are between 20.5 to 32.7 minutes

$$\bar{x} = 26.6$$

$$\varepsilon = t_c \frac{s}{\sqrt{n}} = 2.009 \frac{21.6}{\sqrt{51}} = 6.1$$

$$\bar{x} - \varepsilon = 20.5$$

$$\bar{x} + \varepsilon = 32.7$$

Hypothesis Testing

- **Test hypothesis using rejection region**

- <u>Step I Hypothesis</u>

  $H_0 : \mu = 30$ (claim)

  $H_a : \mu \neq 30$

- <u>Step II Test Statistics</u>

  $$t = \frac{\bar{x} - \mu}{\dfrac{s}{\sqrt{n}}} = \frac{26.6 - 30}{\dfrac{21.6}{\sqrt{51}}} = -1.124$$

- <u>Step III Rejection Region</u>

  $x < -2.009 \cup x > 2.009$

- <u>Step IV Conclusion</u>

  At 5% level of significance, we fail to reject H_0

  There is enough evidence to support the claim

Hypothesis Testing

- **Test hypothesis using p-value**
- <u>Step I Hypothesis</u>

  $H_0 : \mu = 30$ (claim)

  $H_a : \mu \neq 30$

- <u>Step II p-value</u>

  $p - value = 0.266 > \alpha = 0.05$

- <u>Step III Conclusion</u>

  At 5% level of significance, we fail to reject H_0

  There is enough evidence to support the claim

Conclusion

- We hypothesized that Century teachers' commute time average is 30 minutes. In our survey of 51 teachers, we find the sample mean of 26.6 minutes with a standard deviation of 21.6 minutes. We conclude that the population mean for all the teachers is between 20.5 to 32.7 minutes with 95% confident. We test our initial hypothesis with 5% level of significance, and confirm our hypothesis is correct.