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12. Analyzing Customer Wait times:

Dataset:

- Customer ID
- Wait time (minutes)

Summary stats (wait time)

- mean = 5.356
- standard deviation = 0.39
- minimum = 4.5
- maximum = 6.30
- skewness : 0.0500
- Kurtosis : -0.3453
- IQR : 5.675 - 5.1 = .575
- Median : 5.35

* standard deviation is small ⇒ dataset closely packed around mean

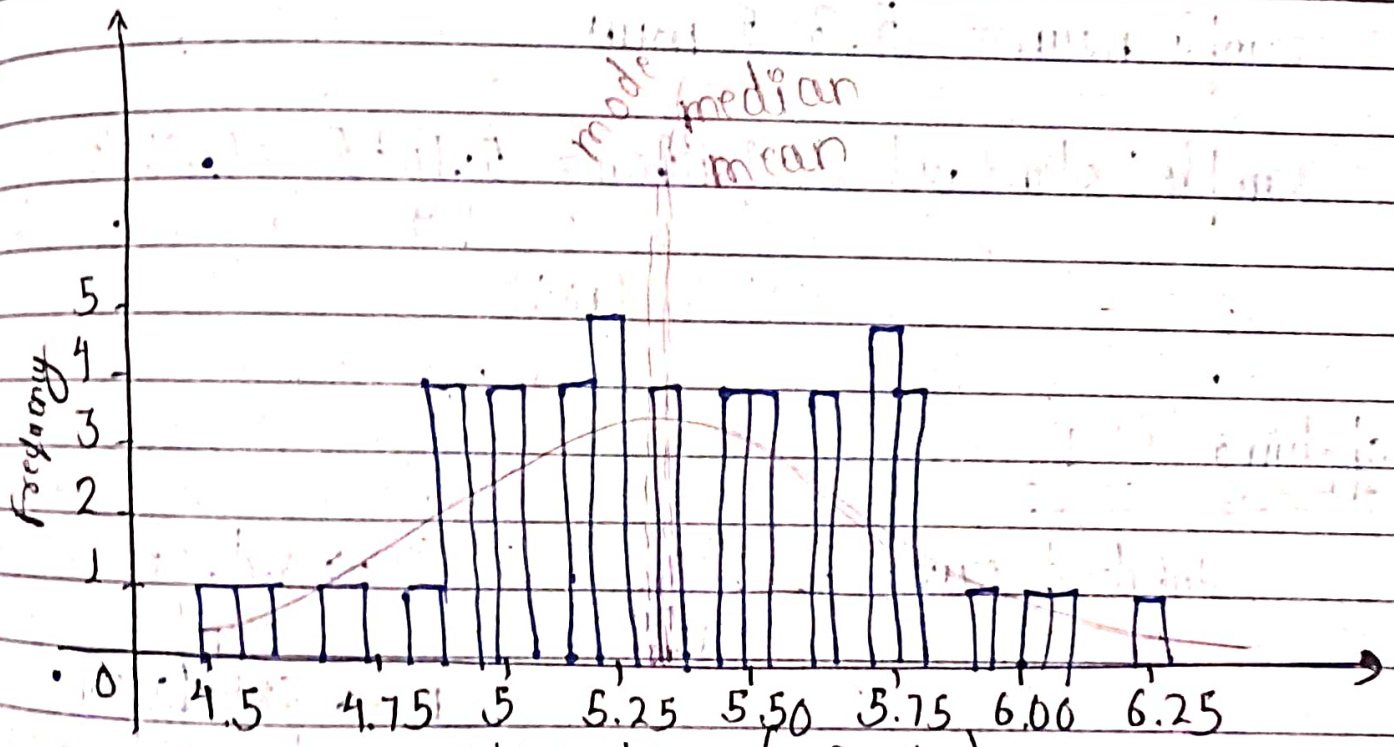
* IQR is small ⇒ dataset is tightly clustered around median.

* skewness = 0.05 (almost perfectly symmetric)

* kurtosis is -ve (slightly platykurtic)

⇒ somewhat flatter peak and thinner tails

Plotting the data into a histogram



* we see the distribution follows a flatter normal distribution.

* almost mean = median = mode.

⇒ normal distribution.

- we see Normal distribution makes most sense.
- CLT (Central limit theorum)

we take sample of 20 customers

sample mean = 5.365 mins

sample standard deviation = $\frac{5.1655}{19}$ = 0.2718

$(n-1)$

applying CLT

Standard error = $\frac{\sigma}{\sqrt{n}}$, $\sigma \rightarrow$ s.d. of sample

$n \rightarrow$ ~~population~~ samplesize.

$= \frac{0.5215}{\sqrt{20}} = 0.1166$ mins

then according to CLT,

sampling distribution of sample means

$$\bar{X} \sim N(5.365, (0.1166)^2)$$

- Probability that the sample mean exceeds 5.5 minutes:

$$P(\bar{X}_{(20)} > 5.5)$$

$$Z = \frac{5.5 - 5.356}{0.1166} = 1.241$$

$$\phi(1.241) = 0.8928$$

$$P(Z > 1.241) = 1 - 0.8928 = 0.1072$$

$$P(\bar{X}_{(20)} > 5.5) = 10.72\%$$

Interpretation -

- with sample size of 20, the avg. wait time is very likely to be close to the overall mean of 5.365 mins, ∵ standard error is about 0.1166 min.
- the chance that avg. exceeds 5.5 mins is quite low (~10.72%)
- for samples for most of them their mean wait times stays below 5.5 min, indicating relatively stable service time.