Stat 250: Stat Principles and Practices
Central Limit Theorem illustration

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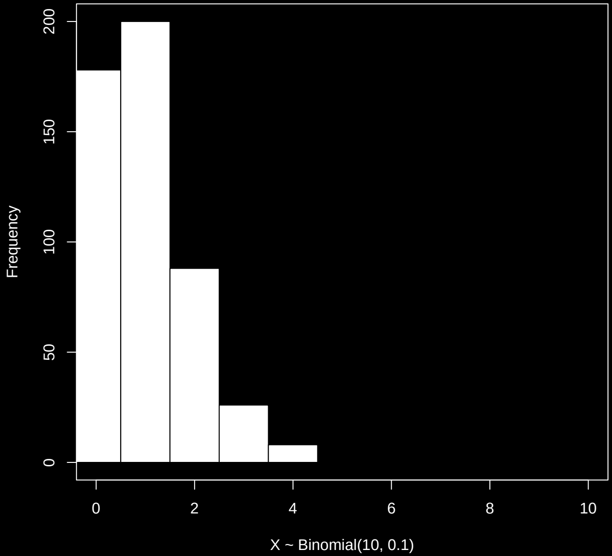
Set-up: $Binomial(10, \ p)$

Generate 500 data sets of size n

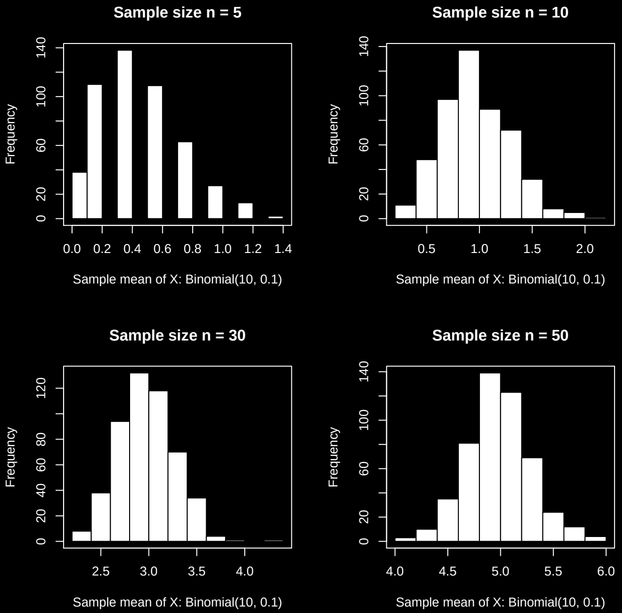
Illustration with $n = 5, \ p = 0.1$

Sample	1	2	3	4	5	$\bar{x}$
Data set 1	0	0	1	2	0	0.6
Data set 2	0	0	1	3	0	0.8
Data set 3	0	1	2	2	2	1.4
Data set 4	0	0	0	3	1	0.8
Data set 5	1	2	2	0	0	1.0
$\vdots$			$\vdots$			$\vdots$

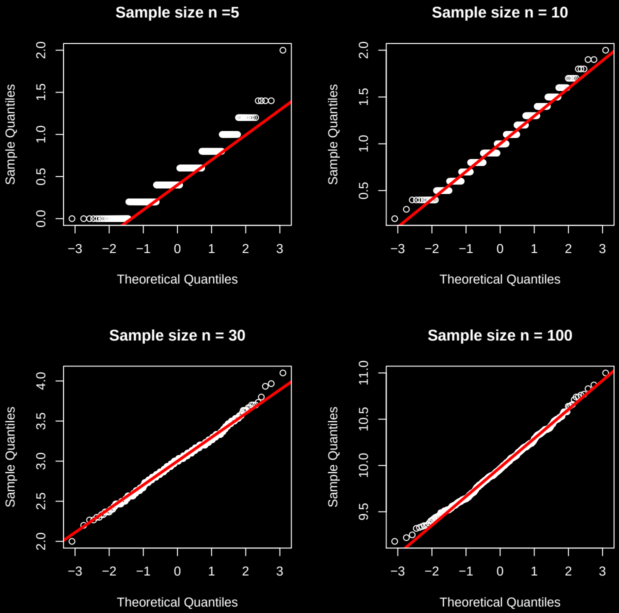
Binomial(10, *p*) histogram



CLT illustration



CLT illustration: normal probability plot



Foreshadowing: Statistical Inference

- Collect *binomial*$(n,\ p)$ random sample: $X_1, X_2, \ldots, X_n$.
- Normal approximation to the binomial
- Another CLT: For "large n and reasonable p,"

$$\frac{\sum X_i}{n} \sim AN\left(p, \sqrt{\frac{p(1-p)}{n}}\right).$$

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- Use the average to estimate p and sampling distribution to assess variability.