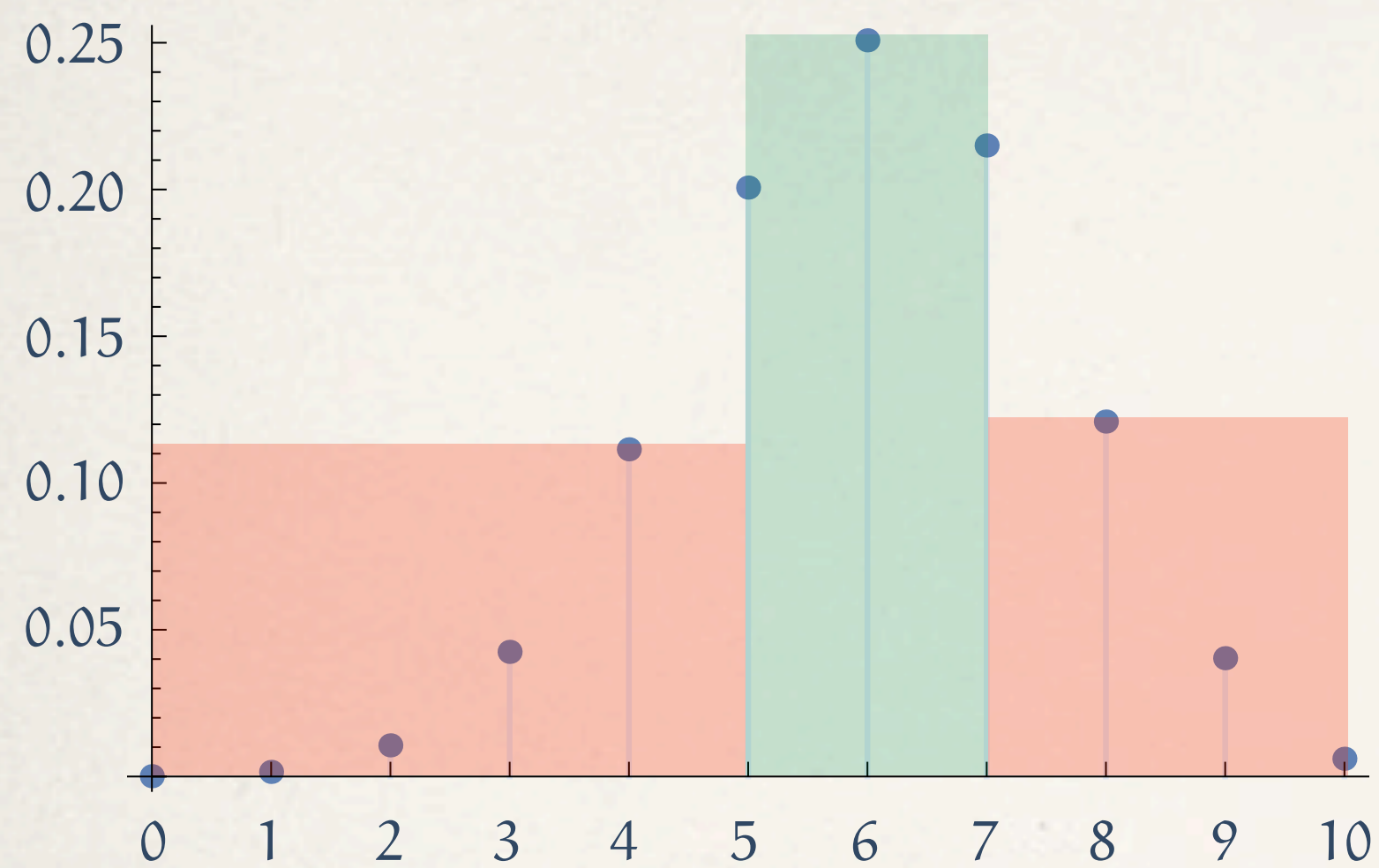


## Chebyshev's inequality

If  $S_n \sim \text{Binomial}(n, p)$  and  $\epsilon > 0$ , then

$$\mathbf{P}\left\{\left|\frac{S_n}{n} - p\right| > \epsilon\right\} \leq \frac{1}{4n\epsilon^2}$$





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**Slogan** (THE LAW OF LARGE NUMBERS)

The probability that  $\frac{S_n}{n}$  deviates from its expected value  $p$   
*by even a small amount* tends to zero as the sample size  $n$  tends to infinity.