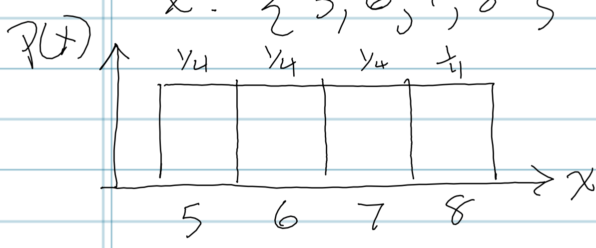
Section 7.4 → Sampling Distributions of Sample Means

Quantitative Population

$x: \{5, 6, 7, 8\}$



$\mu = E(x) = 6.5$

$\sigma = 1.1180$ ← pop. std. dev.

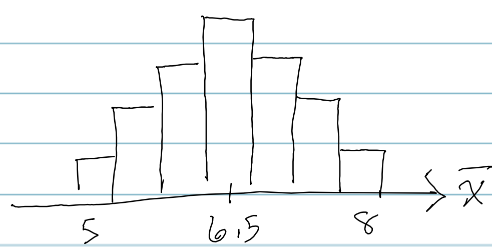
$\sigma^2 = Var(x) = \frac{5}{4} = 1.25$

Look at all samples of size $n = 2$ (with replacement)

$\{5,5\}$ $\{5,6\}$ $\{5,7\}$ $\{5,8\}$
$\{6,5\}$ $\{6,6\}$ $\{6,7\}$ $\{6,8\}$
$\{7,5\}$ $\{7,6\}$ $\{7,7\}$ $\{7,8\}$
$\{8,5\}$ $\{8,6\}$ $\{8,7\}$ $\{8,8\}$

$\xrightarrow{\text{compute } \bar{x}}$ sample means

$\{5, 5.5, 6, 6.5$
$5.5, 6, 6.5, 7$
$6, 6.5, 7, 7.5$
$6.5, 7, 7.5, 8\}$



$\bar{x}$	freq
5	1
5.5	2
6	3
6.5	4
7	3
7.5	2
8	1

$\mu_{\bar{x}} = E(\bar{x}) = 6.5 = \mu$

$\bar{x}$ is an unbiased estimate of μ.

$\sigma_{\bar{x}} = .7906 = \frac{\sigma}{\sqrt{n}}$

$\sigma_{\bar{x}}^2 = Var(\bar{x}) = \frac{5}{8}$

$= \frac{\sigma^2}{2} = \frac{\sigma^2}{n}$

Shape → Approaching Normality

Center: $\mu_{\bar{x}} = \mu$

Spread: $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$