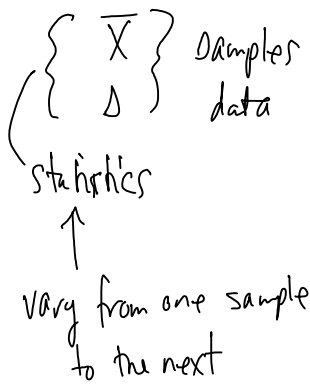
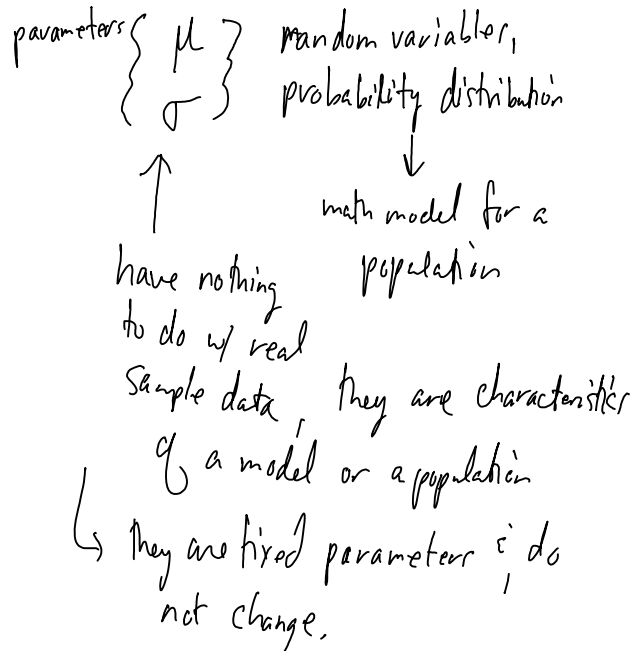


Chapters 1/2

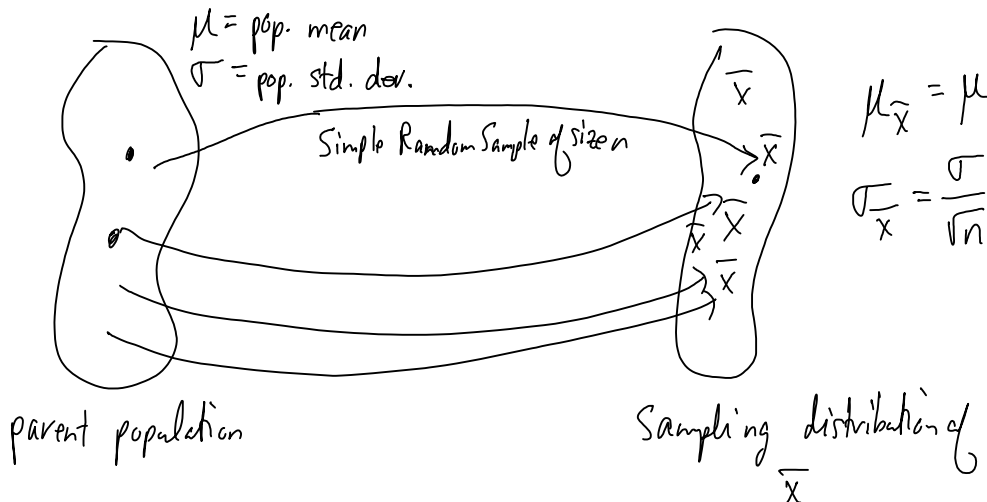


Chapter 3



Chapter 4 Sampling Distributions —

instead of observation one at a time, we consider them  $n$  at a time — in particular we want to know how  $\bar{x}$  behaves



Consider averages of two die rolls - here are possible values:

		Die 2					
	1	2	3	4	5	6	
1	1	1.5	2	2.5	3	3.5	

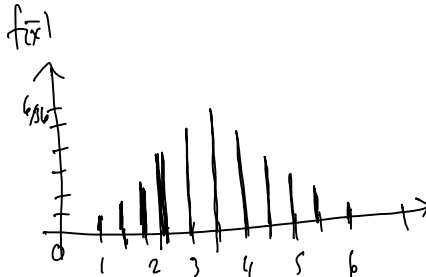
1 die roll			
X	$f(x)$	$x f(x)$	$x^2 f(x)$
1	1/6	1/6	1/6
2	1/6	2/6	4/6
3	1/6	3/6	9/6
4	1/6	4/6	16/6

		Die 2					
		1	2	3	4	5	6
Die 1	1	1	1.5	2	2.5	3	3.5
	2	1.5	2	2.5	3	3.5	4
	3	2	2.5	3	3.5	4	4.5
	4	2.5	3	3.5	4	4.5	5
	5	3	3.5	4	4.5	5	5.5
	6	3.5	4	4.5	5	5.5	6

2	1/6	2/6	1/6
3	1/6	3/6	2/6
4	1/6	4/6	3/6
5	1/6	5/6	4/6
6	1/6	6/6	5/6
	1	2	3

Sampling distribution of  $\bar{x}$

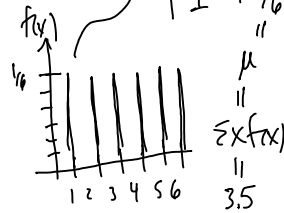
$\bar{x}$	$f(\bar{x})$
1	1/36
1.5	2/36
2	3/36
2.5	4/36
3	5/36
3.5	6/36
4	5/36
4.5	4/36
5	3/36
5.5	2/36
6	1/36



$$\mu_{\bar{x}} = \mu = 3.5$$

$$\sigma_{\bar{x}}^2 = \frac{35}{24} = \frac{1}{2} \cdot \frac{35}{12}$$

$$\sigma_{\bar{x}} = \sqrt{\frac{35/12}{2}} = \frac{\sqrt{35/12}}{\sqrt{2}} = \frac{\sigma}{\sqrt{2}}$$



$$\sigma^2 = \sum x^2 f(x) - \mu^2$$

$$= \frac{91}{6} - (3.5)^2 = \frac{35}{12}$$

$$\sigma = \sqrt{\frac{35}{12}} = 1.7078$$

If the original (parent population) is normal, then ~~then~~  
the sampling distribution of  $\bar{x}$ 's will be normal (for any n).

otherwise, for any other parent pop., if  $n \geq 30$  (approx.),  
 $\bar{x}$ 's will be approx. normally dist.

of mean  $\mu_{\bar{x}} = \mu$  ; std. dev.  $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$

also true in first case.

Ex. bass weights normal,  $\mu = 6.1$  lbs,  $\sigma = 1.3$  lbs  
 $X \sim N(6.1, 1.3)$

(a) describe the sampling dist.  $f_{\bar{x}}$  for a sample of size  $n = 16$ .

↳ ctr, spread, shape

Since  $X$  is normal,  $\bar{X}$  will be normal  $\hookrightarrow$

$$\mu_{\bar{X}} = \mu = 6.1 \text{ lbs}$$

$$\sigma_{\bar{X}} = \frac{\sigma}{\sqrt{n}} = \frac{1.3}{\sqrt{16}} = \frac{1.3}{4} \approx .33 \text{ lbs}$$

$$\bar{X} \sim N(6.1, .33) \quad (n=16)$$

(b)  $P(X < 5.5)$

Ch 4: 1, 3, 5, 6

(c)  $P(\bar{X} < 5.5)$