Stats Ch 7 A 1, 3, 5, 7

	Pop.	Parameter	Sample	Statistic
(1)	People who signed card	proportion of those signing who quit.	Rand. Sample of 1000 who signed cards	$\hat{p} = .21$
(3)	All turkey Meat.	Min. temp	4 points in turkey (Rand)	Sample minimum = 170°F

(5) pop. param. $\mu = 2.5003$

sample statistic $\overline{x} = 2.5009$

(7) pop. param. $p = .52$

samp. stat. $\hat{p} = .48$

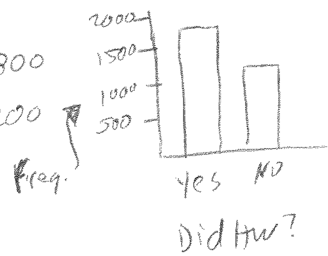
Stats 7-1 B 9, 11, 13, 17-20

(9) a) Not a sampling distr., it is <u>NOT</u> all possible samples of size 100 there would be more than 250. This is an approx. distr.

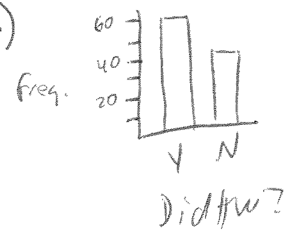
b) Center: .6
Shape: sym. bell shaped
Spread: .47 to .74
Outliers: .47, .73, .74

c) ~~If~~ our sample $\hat{p} = .45$ we would be skeptical of the .6 claim
None in sample distr were this low.

(11) a) $3000(.6) = 1800$
$3000(.4) = 1200$



b)



(13) $\mu = 50$ $\sigma = 3$ $N = 10$

a) Center: $9°F^2$
Shape: skewed right
Spread: 2 to 27.5
Outliers: 27.5, maybe 24

b) 25 is too big.
Only 1 is this large in simulation out of 500.
Manufacturer's claim prob. false

(17) $2000 \times 10 = 20{,}000$
a) this is less than ~~...~~ the pop. so the variability of the sample will be the same for all states. (N same for all states)

b) Yes ~~variability~~
N is much larger in Calif than Wyo. so Var will be less in Calif.

(18) a) NO - think of the targets
b) Yes

(19) a) unbiased: B & C Note: the book says B is Biased
b) Best: B

(20) a) $\bar{x}$ close to μ
b) More info = More precision, decreased variability
Law of Large Numbers.

Stats 7-2 C 21-24, 27, 29, 33, 35, 37, 41

21 D

22 E

23 C

24 B

27 a) $\hat{p} = \frac{8}{25} = .32$ → not too surprising, this occurs in the simulation

$\hat{p} = \frac{5}{25} = .25$ → surprising, this is very rare in simulation

b) n = 50 more surprising because variability should decrease as n↑

29 $n = 25$ $p = .45$

a) $\mu_{\hat{p}} = p = .45$

b) $\sigma_{\hat{p}} = .0995$ $10 \cdot 25 = 250$ N will be more so $\sigma_{\hat{p}}$ is ok

c) $np = (25)(.45) = 11.25$
$n(1-p) = 25(.55) = 13.75$ } Both More than 10 so it will be Normally Distr.

d) $\sigma_{\hat{p}} = .0704$ less variable

33 Normal Rules Not Met

$np = 15(.3) = 4.5$ — not over 10

35 $n = 1012$
$\hat{p} = .67$ $p = .7$

a) $\mu_{\hat{p}} = p = .7$

b) $\sigma_{\hat{p}} = .0144$ Note: use p not $\hat{p}$
pop of US over 10120 ✓

c) $np = 1012 \cdot .7 = 708.4$
$n(1-p) = 1012 \cdot .3 = 303.6$ } over 10 ✓

d) Normal $p(x \leq .67) = .0186$ this is quite low

37 $\sigma_{\hat{p}} = \sqrt{\frac{p(1-p)}{n}}$ $\frac{1}{2}$ of $.0144 = .0072$ $.0072 = \sqrt{\frac{.7(1-.7)}{n}}$

$\frac{.00005184}{1} = \frac{.7(.3)}{n}$ $n = 4051$

* Book has 4048 a dif. way.

41 $p = .9$ $n = 100$ $\times 10 = 1000$ OK

a) $.9(100) = 90$
$.1(100) = 10$ } OK $\mu_{\hat{p}} = .9$ $\sigma_{\hat{p}} = .03$
Normal $p(x \leq .86) = .09$

b) Not too rare at 9% that we are certain that the 90% claim is wrong.

Stats 7-3 D 43-46, 49, 51, 53, 55

(43) $p = .3$ $n = 750$ $10n = 7500 \checkmark$ $750(.3) = 225 \checkmark$ $750(.7) = 525 \checkmark$

(43) B $\mu_{\hat{p}} = p = .3$

(44) C $\sigma_{\hat{p}} = \sqrt{\frac{.3 \cdot .7}{750}} = .017$

(45) B at $n = 375$ $\sigma_{\hat{p}} = .024$

OR $\sqrt{\frac{.3 \cdot .7}{750}}\, x = \sqrt{\frac{.3 \cdot .7}{375}}$

$\frac{\sqrt{.21}}{\sqrt{750}}\, x = \frac{\sqrt{.21}}{\sqrt{375}}$

$x = \frac{\sqrt{.21}}{\sqrt{375}} \cdot \frac{\sqrt{750}}{\sqrt{.21}} = \sqrt{\frac{750}{375}} = \sqrt{2}$

$0.017x = .024$

$x = 1.412 = \sqrt{2}$

(46) B

(49) $N = 10{,}000$ Skewed R $\mu = 225s.$ $\sigma = 60s.$

SRS of $n = 10$

$\mu_{\bar{x}} = \mu = 225s.$

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{60}{\sqrt{10}} = 18.974$ sec.

(51) $30 = \frac{60}{\sqrt{n}}$ $30\sqrt{n} = 60$ $\sqrt{n} = 2$ $n = 4$ songs

(53)

a) $\mu = 188$ $\sigma = 41$ (mg/dL) SRS $n = 100$

Shape: Normal since pop dist. is Normal

Center: $\mu_{\bar{x}} = \mu = 188$ mg/dL

Spread: $\sigma_{\bar{x}} = \frac{41}{\sqrt{100}} = 4.1$ mg/dL

b) $188 + 3 = 191$
$188 - 3 = 185$

$P(185 \le \bar{x} \le 191) = P(-.731 \le z \le .731) = .5357$

AP STAT form

c) New $\sigma_{\bar{x}} = \frac{41}{\sqrt{1000}} = 1.3$

$P(185 \le \bar{x} \le 191) = P(-2.31 \le z \le 2.31) = .979$

Better because $\bar{x}$ will be more precise as n increases

(55)

$\mu = 298$ ml $\sigma = 3$ ml Normal pop.

a) $P(x < 295) = P(z < -1) = .1587$

b) $n = 6$ $\mu_{\bar{x}} = 298$ $\sigma_{\bar{x}} = \frac{3}{\sqrt{6}} = 1.225$

$P(\bar{x} < 295) = P(z < -2.448) = .0071$

Stats 7-3 E 57, 59, 61, 63, 65-68

57) No - the histo. of the sample means will look Normal
the histo. of the sample values will match the pop histo.

59) $N = 10,000$ skewed Right $\mu = 225$ sec. $\sigma = 60$ sec.

a) Since pop is NOT Normal, the dist. of $\bar{x}$ should be over 30 to be considered Normal.

b) $n = 36$ - over 30, use Normal!

$\mu_{\bar{x}} = 225$ $\sigma_{\bar{x}} = \frac{60}{\sqrt{36}} = 10$ $p(\bar{x} > 240) = p(z > 1.5) = .067$

* Common AP Q

61) $\mu = 190$ $\sigma = 35$ $n = 30$

a) pop is NOT Normal - this is for 1 value, not $\bar{x}$

b) $6000 / 30 = 200$ ← In order to have total wght over 6000, then $\bar{x}$ would have to be over 200.

$\mu_{\bar{x}} = 190$ $\sigma_{\bar{x}} = \frac{35}{\sqrt{30}} = 6.39$ Normal since $n > 30$

$p(\bar{x} > 200) = p(z > 1.56) = .0588$

About 6% chance total wght exceeds 6000

63) $\mu = 250$ $\sigma = 300$ Skewed Right

$n = 10,000$ 10% condition met, there are more than 100,000 total homeowners

$\mu_{\bar{x}} = 250$ $\sigma_{\bar{x}} = \frac{300}{\sqrt{10000}} = 3$

$p(\bar{x} > 275) = p(z > 8.333) = 0$

Very unlikely for $\bar{x} > 275$

65) Normal $\mu = 515$ $\sigma = 114$ $n = 100$

A

66) C

C is true for μ, not mean of $\bar{x}$

67) $n = 219$ $\bar{x} = 810$ B

Note D is CLT, not bias definition

68) D