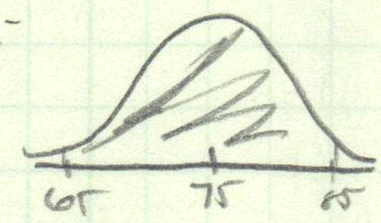
Chapter 23 Exercise Set A

1 a - $7,611 / 100 = 76.11$
b - $73.94 \times 100 = 7,394$

2 $box_{ave} = 75$, $box_{SD} = 10$, 100

$EV_{ave} = 75$
$SE_{ave} = \frac{100}{100} = 1$
$SE_{sum} = 10 \times \sqrt{100} = 100$

a-



$\frac{65-75}{1} = -10$
$\frac{85-75}{1} = 10$
> Almost 100%.

b-

$\frac{74-75}{1} = -1$
$\frac{76-75}{1} = 1$
> 68% in the middle.

3a False, there is a 68% that the average of draws will be between 190 - 210

3b True.

4a draws; box

4b Sum; average.

5a 50 ± 2 $SE_{sum} = 20 \times \sqrt{100} = 200$ $SE_{ave} = \frac{200}{100} = 2$

5b Same 100/10,000 tickets is a very small portion.

5c SE = 0 because all tickets are drawn & there is no error!

6 The chance that the average of the draws is between 2.25 - 2.75 inclusive.

7 The Percent. of time, 4 came up

8a The probability of getting a sum of 90 in 25 draws.

8b The probability of getting an average of 3.6 in 25 draws

8c No, averages are related to sum's.

9a True

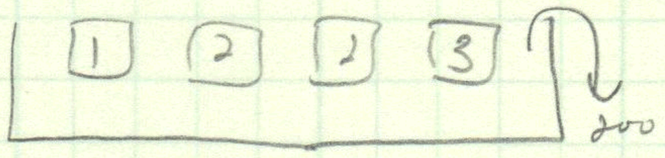
9b False the EV is 2 the EV doesn't have an error associated with it #9c does.

9c True.

9d False

9e True

9f False, we know the contents the $box_{ave} = 2$



$box_{ave} = 2$
$box_{SD} = .707$
$SE_{SUM} = .707 \times \sqrt{200} = 10$

$EV_{AVE} = 2$
$SE_{AVE} = \frac{10}{200} = .05$

10 $25/25 = 1$ $25 \rightarrow 1$
$50/25 = 2$ $50 \rightarrow 2$
$55/25 = 2.2$ $55 \rightarrow 2.2$
} ave and sum are related.

Chapter 23 Exercise Set B

1

population	box
population average	average of the box
sample	draws
sample average	average of the draws
sample size	number of draws.

2a SD of box; there is no error for the box.

2b SE for average of draws; refers to sample.

3 a- estimated from the sample as (bootstrap)
b- estimated from the sample as (it uses the SD)
c- observed.

4 95% of them should contain the parameter

5 a- due to the bootstrap and EVave from each sample.
b- the SE's are different in each sample.
c- All but 1 or 49.

6a 22.3 years. Off by .15 or so.

SE_{sum}: $4.5 \times \sqrt{900} = 135$
$SE_{ave} = 135/900 = .15$

6b $22.3 \pm 2(.15) \Rightarrow 22 - 22.6$

7a We can do this because of the Central Limit Theorem.

$EV_{ave} = 568$ $SE_{ave} = \frac{6087.38}{250} = 24.35$ $SE_{sum}: 385 \times \sqrt{250} = 6087.38$

$CI = 568 \pm (1)(24.35)$
$z_\alpha = 68\%$.

7b False, this is a misinterpretation of the Confidence Interval.

8 False, the samples will be different and give different EVave and SEave.

9a $EV_{ave} = 61,700$ ← box given!! → $SE_{sum} = 50,000 \times \sqrt{625} = 1,250,000$
$SE_{ave} = 1,250,000/625 = 2000$

$+1 = \frac{x - 61,700}{2,000} \Rightarrow x = 63,700$

9b $\frac{58,700 - 61,700}{2000} = -1.5$ Standard Units.

Chapter 23 Exercise Set C

1

# draws	EVsum	SEsum	EVave	SEave
25	75	10	3	.4
100	300	20	3	.2
400	1200	40	3	.1

$box_{ave} = 3$ $box_{SD} = 2$

2a True by the bootstrap.

2b Cannot be determined, we need the box_{SD}.

3a Estimated from the data (box) as.

3b Cannot tell because we still need SD_{box}.

4a $box_{SD} = 1.12$ $SE_{sum} = 1.12 \times \sqrt{40} = 7.1$ $SE_{ave} = 7.1/40 = .18$

SUM ; AVE

4b 20 ; 30 ; 40

5 There is no way to find an SD because there is no spread.

6 $box_{SD} = 10$ $SE_{sum} = 10 \times \sqrt{100} = 100$ $SE_{ave} = 100/100 = 1$

$CI = 200 \pm 1(2)$

$box_{SD} = 20$ $SE_{sum} = 20 \times \sqrt{200} = 282.84$ $SE_{ave} = \frac{282.84}{200} = 1.41$

$CI = 200 \pm 1.41(2)$

$box_{SD} = 40$ $SE_{sum} = 40 \times \sqrt{400} = 800$ $SE_{ave} = \frac{800}{400} = 2$

$CI = 200 \pm 2(2)$

a) 200.4 matches with A
198.1 matches with B
203.6 matches with C
} look at z scores.

b) It could be chance error but it's not likely.

Chapter 23 Exercise Set D

1 $EV_{ave} = 1.86$
$SE_{ave} = .03$

$box_{SD} = .80$
$SE_{sum} = .80 \times \sqrt{750} = 22$

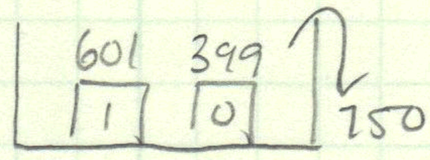
$CI = 1.86 \pm 2(.03) \Rightarrow 1.86 \pm .06$

2 Since the answer to the question is a yes or no, we'll do a percent CI

$EV_{\%} = (451/750) \times 100 = 60.1\%$

$SE_{\%} = (13.4/750) \times 100 = 1.79\%$

$CI = 60.1\% \pm 3(1.79\%)$
$= 60.1\% \pm 5.4\%$



$box_{SD} = .4897$
$SE_{sum} = .4897 \times \sqrt{750}$
$= 13.4$

3 Not Possible. The contents of the box are too extreme, the data won't follow the normal curve.

4 Not Possible. Not an SRS, it's a cluster sample.

5a Sample of Convenience

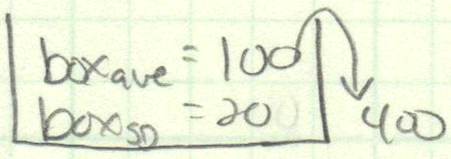
5b Same as a. (Could call it a cluster)

6 Yes $297/100 = 2.97 = EV_{ave}$.
No you can't attach an error w/o an SD.

7 They are the same procedure.

Chapter 23 Review Exercises

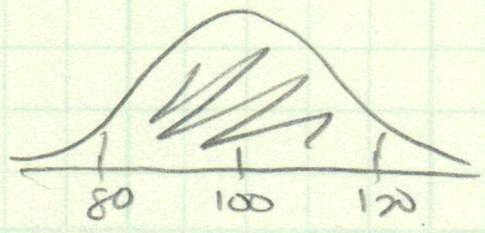
1a



$SE_{sum} = 20 \times \sqrt{400} = 400$

$SE_{ave} = 400/400 = 1$

$EV_{ave} = 100$

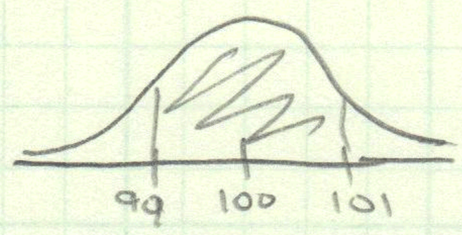


$\frac{80-100}{1} = -20$

$\frac{120-100}{1} = 20$

> Almost 100% in middle!

1b



$\frac{99-100}{1} = -1$

$\frac{101-100}{1} = 1$

> 68% in middle

2

$SE_{sum} = 2.3 \times \sqrt{500} = 51.43$

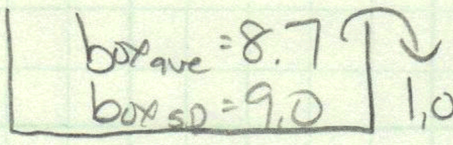
$SE_{ave} = \frac{51.43}{500} = .10$

$EV_{ave} = 71.3$

bootstrap!

a - True
b - True
c - False, a CI says nothing about the contents of a box.

3



$SE_{sum} = 9.0 \times \sqrt{1000} = 284.6$

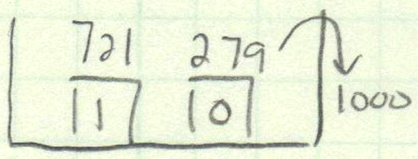
$SE_{ave} = \frac{284.6}{1000} = .285$

$EV_{ave} = 8.7$

a - $8.7 \pm .285$ or so.
b - $8.7 \pm 2(.285) \Rightarrow 8.7 \pm .6$

4 Not possible it is now a cluster sample and our formulas won't work.

5



bootstrap!

$box_{SD} = .45$

$SE_{sum} = .45 \times \sqrt{1000} = 14.2$

$EV_{\%} = 72.1\%$

$SE_{\%} = \frac{14.2}{1000} \times 100 = 1.42\%$

$CI = 72.1\% \pm 2(1.42\%) \Rightarrow 72.1\% \pm 2.84\%$

6 a - No our formulas won't work.

b - Yes $EV_{ave} = 301$

$SE_{ave} = \frac{948.7}{1000} = .95 \approx 1$

$SE_{sum} = 30 \times \sqrt{1000} = 948.7$

7 Neither, this sample isn't a SRS it's done out of convenience so the formula's don't apply

8 a- True; by definition of CI
b- True, it's a different SE though.
c- We don't know because the data could be really skewed! We need to see it to know.
d- False, the SE and CI don't talk about the sample!
e- False by the Central Limit Theorem.

9 $box_{ave} = 1.7$, $box_{SD} = 2.3$, 2,500

$SE_{sum} = 2.3 \times \sqrt{2500} = 115$
$SE_{ave} = 115/2500 = .046$
$EV_{ave} = 1.7$

$CI = 1.7 \pm 2(.046) \Rightarrow 1.7 \pm .1$

10 $box_{ave} = 2.3$, $box_{SD} = 1.7$, 625

$SE_{sum} = 1.7 \times \sqrt{625} = 42.5$
$SE_{ave} = \frac{42.5}{625} = .068$
$EV_{ave} = 2.3$

a- True
b- False, CI don't apply to samples
c- True By definition
d- False, CI don't say anything about the compositon of the population
e- False, it is right skewed based on box_{ave} & box_{SD}
f- True by the central Limit Theorem.

11 $box_{ave} = 3$, $box_{SD} = 1.41$

$SE_{sum} = 1.41 \times \sqrt{25} = 7.07$
$SE_{ave} = \frac{7.07}{25} = .28$

Something is wrong! The spread is <u>way</u> too big!

12 This is not a SRS so our formula's won't apply and their conclusion is wrong.