Chapter 16 Exercise Set A

1 ACE = 550 - 500 = 50

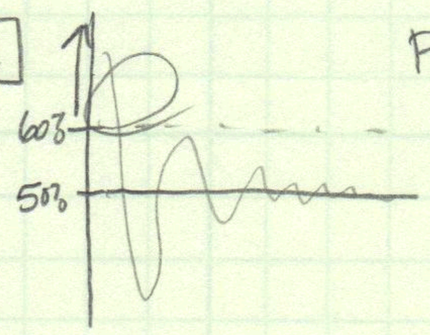
PCE = $\frac{550-500}{1{,}000}$ = 5%

2 ACE = 501,000 - 500,000 = 1,000

PCE = $\frac{501{,}000 - 500{,}000}{1{,}000{,}000}$ = .1%

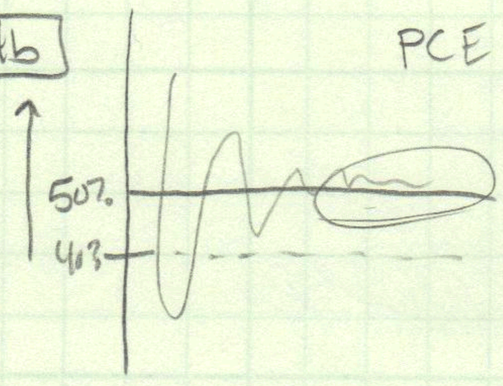
3 False. Each toss is independent!

4a



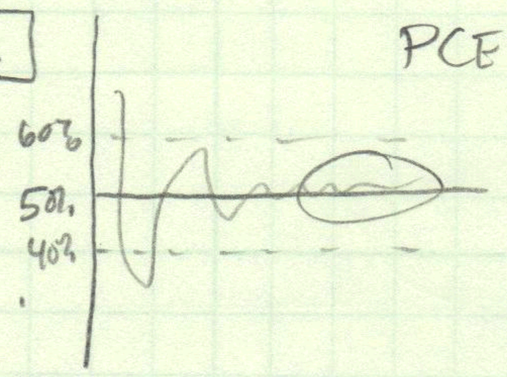
Choose fewer draws! 10

4b



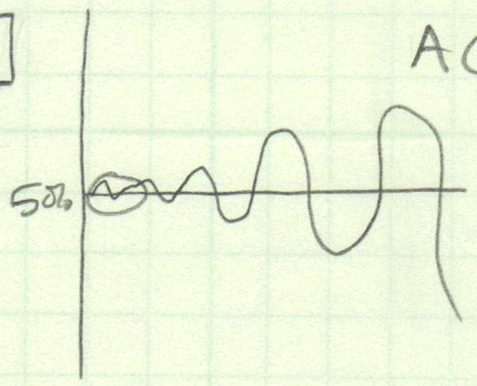
Choose more draws! 100

4c



Choose more draws! 100

4d



Choose fewer draws! 10

5 Hard Problem!

In 38 rolls	expect 18 reds	ACE = 2	PCE = 5.2%
In 76 rolls	expect 36 reds	ACE = 4	PCE = 5.2%

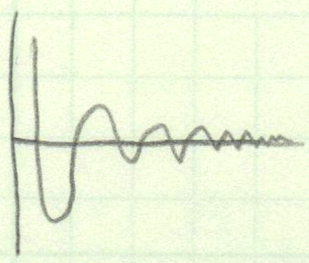
I choose fewer draws because there is more variability in the 76 rolls than what I want. I could have more reds than I want or less and this scares me in this situation.

6 ii) Exactly is really hard to get with lots of draws so I think it's wrong but we will be around 200 if the chance process is fair.

7 ii) With or without replacement isn't going to make that much of a difference with 50,000 marbles. So my reasoning is the same as #6.

8 They are the same because the proportion of -1's is the same in the two boxes & the proportion of 1's is the same in both boxes.

9 Probably just by chance the errors go between positive and negative.



Chapter 16 Exercise Set B

1 $47 \times 1 + 53 \times 2 = \underline{153}$

2a all 1's is smallest $1 \times 100 = 100$
all 2's is largest $2 \times 100 = 200$

2b 1 turns up $\frac{1}{2}$ the time 50 times.
2 turns up $\frac{1}{2}$ the time 50 times.

2c $1 \times 50 + 2 \times 50 = 150$

3a all 1's is smallest $1 \times 100 = 100$
all 9's is largest $9 \times 100 = 900$

3b $\frac{1}{3}$ 1's $1 \times 33 = 33$
$\frac{1}{3}$ 2's $2 \times 33 = 66$
$\frac{1}{3}$ 3's $9 \times 33 = 297 \approx 396$

4 i → 400 ($\frac{1}{2}$ 1's and $\frac{1}{2}$ 9's)
ii → 500 ($\frac{1}{2}$ 4's and $\frac{1}{2}$ 6's)
iii → 500 (all are 5's)

iii → is the best because it's certain
i → is the worst because it has the biggest spread.

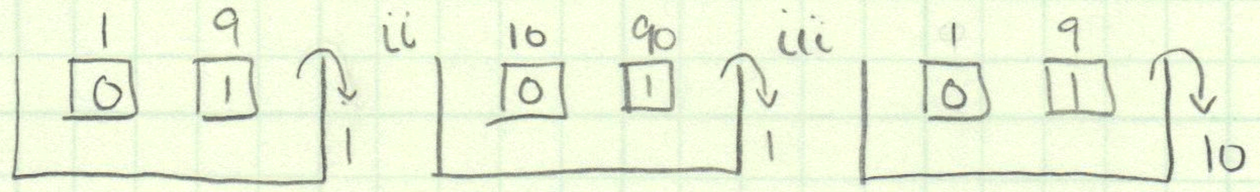
5 $\frac{1}{10}$; $\frac{3}{10}$; $\frac{7}{10}$.

6 i is better, because you would expect to get $\frac{1}{2}$ (-1)'s and $\frac{1}{2}$ (2)'s which means we'd expect
$25(-1) + 25(2) = \underline{25}$
box 2 we expect $\frac{2}{3}$ (-1)'s and $\frac{1}{3}$ (2)'s which means:
$16(-1) + 16(-1) + 16(2) = 0$

7 ii - it adds all the winnings / losings together in order.

Chapter 16 Exercise Set C

1

i - 

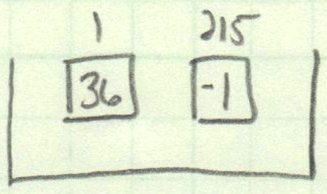
i and ii is the same.
i and iii is not the same because iii says that 10 draws must be one or

$$\frac{9}{10}\times\frac{9}{10}\times\frac{9}{10}\times\frac{9}{10}\times\frac{9}{10}\times\frac{9}{10}\times\frac{9}{10}\times\frac{9}{10}\times\frac{9}{10}\times\frac{9}{10} = 35\%$$

where i is $\frac{9}{10}$ once or 90%.

2 iii he gets paid $17 if his number of the one next to it comes up and they lose $1 if one of the other 36 options come up.

3 10 draws from



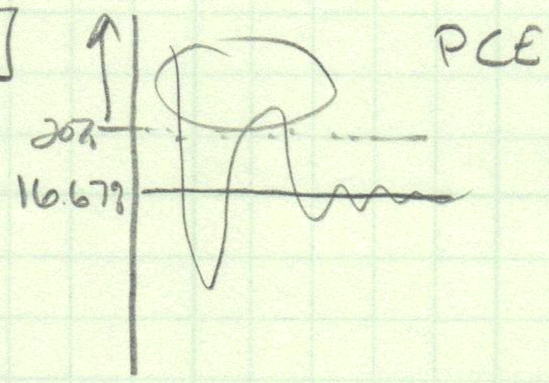
Chapter 16 Review Exercises

1. iii is the best option because the ACE is large ie. exactly is not likely in 10,000 draws but PCE is small.

2. i because all the tickets will be drawn & there are 6,000 1's.

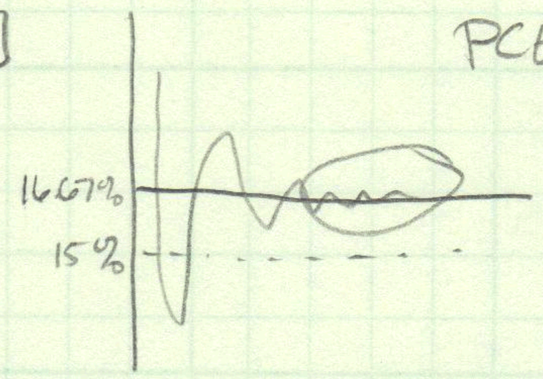
3. Both are wrong. Luck has nothing to do with it & each play is independent in roulette.

4a.



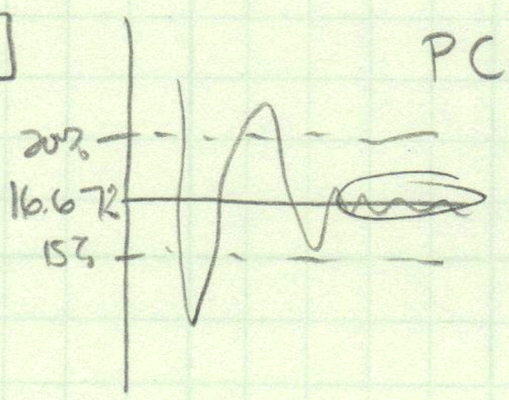
Choose fewer draws! 60

4b.



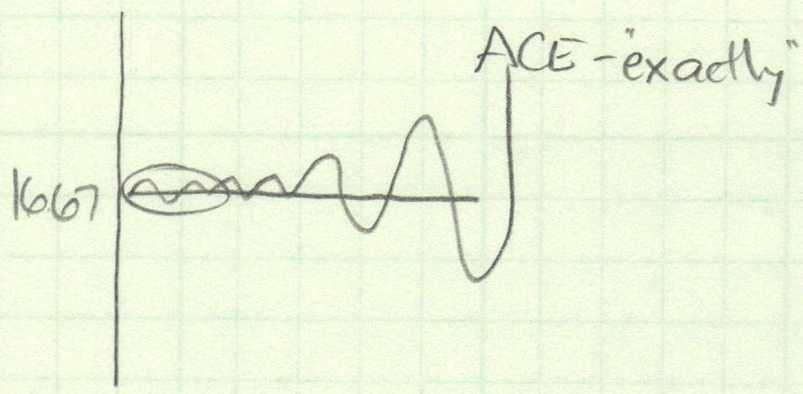
Choose more draws! 600

4c.



Choose more draws! 600

4d.



Choose fewer draws! 60

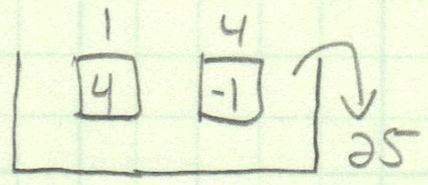
5. True, by the law of averages definition, with many draws it is not likely for ACE to be equal to 0 nor is it likely for PCE to be large. So by the law of averages the statement is true.

6 Hard Problem!

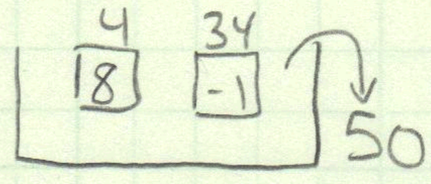
15 couples expect 7.5 same sex ACE = 2.5 PCE = 16.67%
30 couples expect 15 same sex ACE = 5.0 PCE = 16.67%

Choose fewer draws because there is more variability in the 30 couples than what I want. I could have more of the same sex or less and this makes me think low draws.

7 SUM:



8 SUM:



9 ii) because if there are more red than blue the PCE will be lower with more draws. There is more variability with low draws.

10a 30/200 = .15

10b -20/200 = -.10

10c Average = $\frac{\text{Sum of \#'s}}{\text{\# of \#'s}}$ ← given ← # of draws

10d 5/200 = .025
-5/200 = -.025 THEY ARE THE SAME.
↑ ↑
SUM's AVE's