

## Chapter 16

6. Possibility (i) is better. Reason:  $10/15=20/30=2/3$ . Option (i) is like tossing a coin 15 times, and asking for  $2/3$  or more heads. Option (ii) ups the number of tosses to 30. With the bigger number of tosses, you are less likely to get  $2/3$  or more heads. This is like exercise 4(a).

8. The net gain is like the sum of 50 draws from a box with 4 tickets marked "\$8" and 34 tickets marked "\$-1".

10. (a)  $30/200=0.15$ .

(b) -0.1.

(c)  $\text{Average}=\text{sum}/200$

(d) The same:  $5/200=0.025$ , so the options describe the same event in different language.

## Chapter 17

4. The number of aces in 180 rolls of a die is like the sum of 180 draws from a box with 1 ticket marked "1" and 5 tickets marked "0". The number of aces will be around 30, give or take 5 or so. There is about 99.7% chance that the number of aces will be in the range 15 to 45. About 99.7% of the people should get a number in that range.

9. (a) is false, (b) and (c) are true. The reason: if you play (i), the net gain is like the sum of 1000 draws from a box with 12 tickets marked \$2 and 26 marked -\$1. The average of the box is  $-\$2/38$  and the SD is about \$1.39. The expected value for the net gain is  $-\$53$  and the SE is \$44. If you play (ii), there is another box, with bigger SD. The net gain has the same expected value but the SE is \$182. Chance variability helps you overcome the negative expected value, so you are more likely to come out ahead with B. Chance variability also makes it more likely that you will lose big. The chance of coming out ahead with (i) is about 12%. The chance of coming out ahead with (ii) is about 38%.

11. You have to change the box, to 00013. The average of the box is 0.8, and the SD is about 1.2. So the sum will be around 80, give or take 12 or so.