Chap 6

6.1

1)pick n pills from #n bottle (take 1 pill from bottle 1, take 2 pill2 from bottle 2...etc)
2)use scale to weigh them
3)calculate the difference between actual weight and expected weight（210g）
4) the difference weight is caused by the over weight bottle
5) n=difference/0.1

6.2

$P(game1)=p$
$P(game2)=3*p^2*(1-p)+p^3=3p^2-2p^3$
1)$P(game1)>P(game2)$
$p>3p^2-2p^3$ $(2p-1)(p-1)>0$
so when $0<p<0.5$, $P(game1)>P(game2)$ we should play game1
2)$P(game2)>P(game1)$
when $0.5<p<1$ $P(game2)>P(game1)$ we should play game2
3)$P(game2)=P(game1)$
when $p=0,0.5,1$ $P(game2)=P(game1)$
the two games are same

6.3

We can't use 31 dominos to cover the entire board
Actually a domino can only exactly cover 1 black and 1 white square But in this broad there are 30 black squares

6.4

$p(collision)=1-p(non\text{-}collision)$
$p(non\text{-}collision)=p(same\text{-}direction)=2*(1/2)^n=(1/2)^{(n-1)}$
so the $p(collision)=1-(1/2)^{(n-1)}$

6.5

1) fill 5-quart jug $W(3)=0$, $W(5)=5$
2) fill 3-quart with 5-quart water $W(3)=3$, $W(5)=2$
3) dump the water from 3-quart jug $W(3)=0$, $W(5)=2$
4) fill 3-quart with 5-quart water $W(3)=2$, $W(5)=0$
5) fill 5-quart jug $W(3)=2$, $W(5)=5$
6) fill remainder of 3-quart jug with 5-quart $W(3)=3$, $W(5)=4$
7) we get the 4 quart water

6.6

If n men have blue-eye, it will take n day for them to leave the island
1) if n=1, the first night, the blue-eyed people will look around and find that no one else has blue eyes. Then he will realize that he is the only one has blue eye, so he would take the flight that night

2) if n=2, the 2 blue-eyed people will see each other, but they didn't know the exact n is, they won't leave at that night. Until the second night, they will see the other one still didn't leave, they would realize that there were 2 blue-eyed people.

3) if n>=3, the logic will be same as 2), so if n men has blue eyes, all the men will leave at the nth night.

6.7
P(G)=1/2, the family has 50% possibility to have a girl
P(BG)=1/4, the possibility is 1/2 * 1/2
P(BBG)=1/8, and there is 2 boys so the final possibility is 1/8*2

So the final possibility is $\sum i/2^{\wedge}i$
Use DP to implement the algorithm

6.8
```
int count = 0;
      int breakpoint = 0;
      public boolean drop(int floor){
            count++;
            return floor>=breakpoint;
      }
      public int findbreak(int floors){
            int interval=14;
            int previous =0;
            int egg1 = interval;
            //drop egg1 at decreasing interval
            while(!drop(egg1)&&egg1<=floors){
                  interval = interval -1;
                  previous = egg1;
                  egg1 = egg1 + interval;
            }

            //drop egg2 at 1 unit increments
            int egg2 = previous+1;
            while(egg2<egg1&&egg2<=floors&&!drop(egg2)){
                  egg2=egg2+1;
            }
            //if it didn't break, return -1
            if(egg2>floors) return -1;
            return egg2;
      }
```

6.9
There are 10 lockers open
{1,4,9,16,25,36,49,64,81,100}

6.10

1) Divide bottles across available test strips, one drop per test strip
2) After seven days, check the rest strips for result.
3) On the positive test strip: select the bottle associated with into a new set of bottles.
   If size is 1, we have located the poision bottle. If it's greater than one, go to step1.