chapter 4

1. select the maximum from T[0~m-1]

we can use bubble sort to choose the maximum. The worst time complexity is O(n)

```
for i=m-1 to 1 do
  if T[i]>T[i-1]
    swap(T[i],T[i-1])
return T[0]
```

2. Demonstrate the insertion of the keys 5, 28, 19, 15, 20, 33, 12, 17, 10 into a hash table with collisions resolved by chaining. Let the table have 9 slots, and let the hash function be $h(k) = k \bmod 9$.

0	0	0	0	0	0	0
1	1-->28	1-->28-->19	1-->28-->19	1-->28-->19	1-->28-->19	1-->28-->19
2	2	2	2	2-->20	2-->20	2-->20
3	3	3	3	3	3	3-->12
4	4	4	4	4	4	4
5-->5	5-->5	5-->5	5-->5	5-->5	5-->5-->33	5-->5-->33
6	6	6	6-->15	6-->15	6-->15	6-->15
7	7	7	7	7	7	7
8	8	8	8	8	8	8
9	9	9	9	9	9	9

0	0
1-->28-->19	1-->28-->19-->10
2-->20	2-->20
3-->12	3-->12
4	4
5-->5-->33	5-->5-->33
6-->15	6-->15
7	7
8-->17	8-->17

9 9

3. hash table

A=0.618033988

$h(61)=\lfloor 2000\times((61\times 0.61803)mod 1)\rfloor$ = 1400

$h(62)=\lfloor 2000\times((62\times 0.61803)mod 1)\rfloor$ = 636

$h(63)=\lfloor 2000\times((63\times 0.61803)mod 1)\rfloor$ = 1872

$h(64)=\lfloor 2000\times((64\times 0.61803)mod 1)\rfloor$ = 1108

$h(65)=\lfloor 2000\times((65\times 0.61803)mod 1)\rfloor$ = 204

4. hash table

h'(10)=10,h'(22)=0,h'(31)=9,h'(4)=4,**h'(15)=4**,h'(28)=6,**h'(17)=6**,**h'(88)=0**,**h'(59)=4**

liner:

the result is : 22 null 88 null 4 15 28 17 59 31 10

quadratic:

$h(15，1)=8$

$h(17,1)=9$

$h(17,2)=1$

$h(88,1)=4$

$h(88,2)=3$

$h(59,1)=8$

$h(59,2)=7$

the result is: 22 17 null 88 4 null 28 59 15 31 10

double hash:

$h(15,1)=10$

$h(15,2)=5$

$h(17,1)=3$

$h(88,1)=7$

$h(59,1)=8$

the result is: 22 null null 17 4 15 28 88 59 31 10

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let $m=a_2d, h_2(k)=a_1d$

$h(k,i)=x\%m+i\times a_1d\%a_2d$

$h(k, i+1) = x\%m + i \times a_1 d\%a_2 d + a_1 d\%a_2 d$

$h(k, i+1) - h(k, i) = a_1 d\%a_2 d = d(a_1 - a_2)\%m = x_0 d$

so we can only travel the position in $h_1(k) + x_0 * i * d$

only travel 1/d of the table.