习题 6.1

1.
a. 算法: find MinDifference(A[0..n-1])

```
//先对数组排序
//输入n个数字构成的一个数组
//输出两个最接近数的距离
对数组排序
min = A[1] - A[0]
for i ← 1 to n-2 do
    if A[i+1] - A[i] < min   min = A[i+1] - A[i]

return min
```

排序: $O(n\log n)$, 找最小距离: $O(n)$

效率类型: $O(n\log n)$

b. 蛮力算法: $O(n^2)$

∴该算法效率类型更高效

习题 6.2

1. 解:

$$\begin{bmatrix} 1 & 1 & 1 & 2 \\ 2 & 1 & 1 & 3 \\ 1 & -1 & 3 & 8 \end{bmatrix} \xrightarrow[r_3 - r_1]{r_2 - 2r_1} \begin{bmatrix} 1 & 1 & 1 & 2 \\ 0 & -1 & -1 & -1 \\ 0 & -2 & 2 & 6 \end{bmatrix} \xrightarrow{r_3 - 2r_2} \begin{bmatrix} 1 & 1 & 1 & 2 \\ 0 & -1 & -1 & -1 \\ 0 & 0 & 4 & 8 \end{bmatrix}$$

∴ $4x_3 = 8$, $x_3 = 2$

$-x_2 - x_3 = -1$, $x_2 = 1$

$x_1 + x_2 + x_3 = 2$, $x_1 = -1$

2. 解:

a. 由1知 $U = \begin{bmatrix} 1 & 1 & 1 \\ 0 & -1 & -1 \\ 0 & 0 & 4 \end{bmatrix}$, $b = \begin{bmatrix} 2 \\ 3 \\ 8 \end{bmatrix}$

$L = \begin{bmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ 1 & 2 & 1 \end{bmatrix}$

解 $Ly = b$, $y_1 = 2$, $y_2 = -1$, $y_3 = 8$

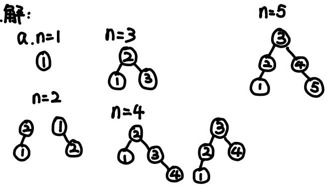
解 $Ux = y$, $x_1 = 1$, $x_2 = -1$, $x_3 = 2$

∴ $x_1 = 1$, $x_2 = -1$, $x_3 = 2$

b. 应归类成变治, 将一个问题化简为两个更简单的问题, 但不能用递归处理

习题 6.3

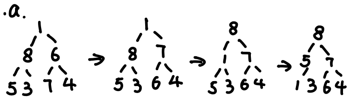
2. 解:



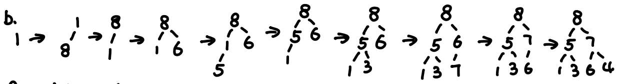
b. h=4

习题6.4

1.a.

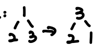


b.

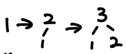


c.不成立,如输入为 1,2,3时

自底向上:



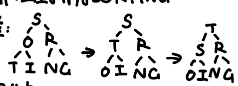
自顶向下:



这两者不一样

7.c.解:堆排序SORTING

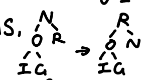
建堆:



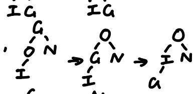
删根节点:

第1次:删T,

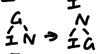
第2次:删S,



第3次:删R,



第4次:删O,



第5次:删N,

第6次,删I

∴排序: G I N O R S T

习题6.5

4.a.计算多项式:

系数	3	-1	0	2	5
$x=-2$	3	-7	14	-26	57

∴$p(x=-2)=57$

b.由a可知,结果为$3x^3-7x^2+14x-26$,
余数为57

7.a.17=10001

$$\begin{array}{cccccc} & 1 & 0 & 0 & 0 & 1 \\ a & a^1 & a^2 & a^4 & a^8 & a^{16+1} \end{array}$$

b.可以,将指数分解为二进制数,逐位处理

$$\begin{array}{lc} 8.\ 1\ 0\ 0\ 0 & 1 \\ a^{16}a^8a^4a^2 & a \\ a\times a^{16}=a^{17} & a \end{array}$$

习题6.6

1.a. 解：假设 $\gcd(m,n)=x$

$m=k_1x$，$n=k_2x$　k_1, k_2 互质

$\therefore \mathrm{lcm}(m,n)=k_1k_2x=\frac{m\times n}{x}=k_1k_2x$

b. $m\times n\in O(1)$，$\gcd(m,n)\in O(\log n)$

$\therefore \mathrm{lcm}(m,n)$ 类型为 $O(\log n)$

2. 将每一个值变为值相反数，构造最大堆

之后再还原为原值