P231 39

a) In the worst case, the number of the most comparisons is $2n+2$. When the size of the list doubles form n to $2n$, the number becomes $4n+2$.
b) In the worst case, the number of the most comparisons is $2\log_2 n+2$. When the size of the list doubles form n to $2n$, the number becomes $2\log_2 n+4$.

P245 41

From $a \equiv b$ (**mod** m) we can know that there exists an integer t such that $a=b + tm$.

We know that $a^k - b^k=(a - b)(a^{k-1} + a^{k-2}b + \ldots + b^{k-1})=tm(a^{k-1} + a^{k-2}b + \ldots + b^{k-1})$ ($k \geq 2,\ k \in \mathbf{Z}$), so ($a^k$ - b^k) (**mod** m)=0 and $a^k \equiv b^k$ (**mod** m) hold.

So $a^k \equiv b^k$ (**mod** m) holds.

P255 25

We can know that $644=(1010000100)_2$. Let's set $x=1$, $i=0$ and *power* =7 **mod** 645=7. Following Algorithm 5 we have the steps followed:

i	*x*	*power*
0	1	7^2 **mod** 645=49
1	1	7^4 **mod** 645=466
2	(466·1) **mod** 645=466	7^8 **mod** 645=436
3	466	7^{16} **mod** 645=466
4	466	7^{32} **mod** 645=436
5	466	7^{64} **mod** 645=466
6	466	7^{128} **mod** 645=436
7	(436·466) **mod** 645=1	7^{256} **mod** 645=466
8	1	7^{512} **mod** 645=436
9	(436·1) **mod** 645=436	/

So 7664 **mod** 645=436.

P256 31

For an integer k≥1, $(10^k - 1)$(**mod** 3)=99…9 (**mod** 3)=0, so we know that 10^k≡1 (**mod** 3).

Let a positive integer be A=$(a_n…a_1a_0)_{10}$ as A=$a_n·10^n$ +…+ a_1·10 + a_0. Then A **mod** 3=$\sum_{i=0}^{n} a_i$ **mod** 3.

So A≡$\sum_{i=0}^{n} a_i$ (**mod** 3) holds. If A **mod** 3=0, then $\sum_{i=0}^{n} a_i$ **mod** 3=0. If $\sum_{i=0}^{n} a_i$ **mod** 3=0 then A **mod** 3=0.

So a positive integer is divisible by 3 iff the sum of its decimal digits is divisible by 3.