**尺取法**

**尺取法：**顾名思义，像尺子一样取一段，借用挑战书上面的话说，尺取法通常是对数组保存一对下标，即所选取的区间的左右端点，然后根据实际情况不断地推进区间左右端点以得出答案。尺取法比直接暴力枚举区间效率高很多，尤其是数据量大的时候，所以说尺取法是一种高效的枚举区间的方法，是一种技巧，一般用于求取有一定限制的区间个数或最短的区间等等。当然任何技巧都存在其不足的地方，有些情况下尺取法不可行，无法得出正确答案，所以要先判断是否可以使用尺取法再进行计算。

使用尺取法时应清楚以下四点：

1、  什么情况下能使用尺取法?  2、何时推进区间的端点？ 3、如何推进区间的端点？ 4、何时结束区间的枚举？

    尺取法通常适用于选取区间有一定规律，或者说所选取的区间有一定的变化趋势的情况，通俗地说，在对所选取区间进行判断之后，我们可以明确如何进一步有方向地推进区间端点以求解满足条件的区间，如果已经判断了目前所选取的区间，但却无法确定所要求解的区间如何进一步得到根据其端点得到，那么尺取法便是不可行的。首先，明确题目所需要求解的量之后，区间左右端点一般从最整个数组的起点开始，之后判断区间是否符合条件在根据实际情况变化区间的端点求解答案。

    现在我们先举个栗子并分析一下尺取法的过程叭～

    以下是几个经典的使用尺取法的例题，都是从挑战书上引用的。我们来挨个分析一下。（尺取法通常会需要对某些量进行预处理，以便能在使用时快速地判断。）

**1、  Poj3061**

**题意：**给定一个序列，使得其和大于或等于S，求最短的子序列长度。

**分析：**首先，序列都是正数，如果一个区间其和大于等于S了，那么不需要在向后推进右端点了，因为其和也肯定大于等于S但长度更长，所以，当区间和小于S时右端点向右移动，和大于等于S时，左端点向右移动以进一步找到最短的区间，如果右端点移动到区间末尾其和还不大于等于S，结束区间的枚举。

这个题目区间和明显是有趋势的：单调变化，所以根据题目要求很容易求解，但是在使用之间需要对区间前缀和进行预处理计算。

**代码如下：**



**2、  poj3320**

**题意：**一本书有 P 页，每页都有a[ i ]个知识点，知识点可能重复，求最少的连续页数来覆盖所有知识点。

**分析：**和上面的题一样的思路，如果一个区间的子区间满足条件，那么在区间推进到该处时，右端点会固定，左端点会向右移动到其子区间，且其子区间会是更短的，只是需要存储所选取的区间的知识点的数量，那么使用map进行映射以快速判断是否所选取的页数是否覆盖了所有的知识点。

**代码如下：**



**3、  poj2566**

**题意：**给定一个数组和一个值t，求一个子区间使得其和的绝对值与t的差值最小，如果存在多个，任意解都可行。

**分析：**明显，借用第一题的思路，既然要找到一个子区间使得和最接近t的话，那么不断地找比当前区间的和更大的区间，如果区间和已经大于等于t了，那么不需要在去找更大的区间了，因为其和与t的差值更大，然后区间左端点向右移动推进即可。所以，首先根据计算出所有的区间和，

排序之后按照上面的思路求解即可。

**代码如下：**

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**4、  poj2739&poj2100**

**题意：**找到某一个区间使得区间内的数的和/平方和等于某一给定值k。

**分析：**很明显了，几乎之与上面的poj2566又是一样的，当区间右端点不能再向右推进且区间和仍小于k的话就可以结束区间的枚举了。

**代码：**

**poj2739：**



**poj2100：******

**总结：**尺取法的模型便是这样：根据**区间的特征**交替推进左右端点求解问题，其高效的原因在于避免了大量的无效枚举，其区间枚举都是根据区间特征有方向的枚举，如果胡乱使用尺取法的话会使得枚举量减少，因而很大可能会错误，所以关键的一步是进行问题的分析！

## 注：在poj2739代码中prime数组的初始化为

prime[ ]={2,3,5,7,11,13,17,19,23,29,31,37,41,43,47,53,59,61,67,71,73,79,83,89,97,101,103,107,109,113,127,131,137,139,149,151,157,163,167,173,179,181,191,193,197,199,211,223,227,229,233,239,241,251,257,263,269,271,277,281,283,293,307,311,313,317,331,337,347,349,353,359,367,373,379,383,389,397,401,409,419,421,431,433,439,443,449,457,461,463,467,479,487,491,499,503,509,521,523,541,547,557,563,569,571,577,587,593,599,601,607,613,617,619,631,641,643,647,653,659,661,673,677,683,691,701,709,719,727,733,739,743,751,757,761,769,773,787,797,809,811,821,823,827,829,839,853,857,859,863,877,881,883,887,907,911,919,929,937,941,947,953,967,971,977,983,991,997,1009,1013,1019,1021,1031,1033,1039,1049,1051,1061,1063,1069,1087,1091,1093,1097,1103,1109,1117,1123,1129,1151,1153,1163,1171,1181,1187,1193,1201,1213,1217,1223,1229,1231,1237,1249,1259,1277,1279,1283,1289,1291,1297,1301,1303,1307,1319,1321,1327,1361,1367,1373,1381,1399,1409,1423,1427,1429,1433,1439,1447,1451,1453,1459,1471,1481,1483,1487,1489,1493,1499,1511,1523,1531,1543,1549,1553,1559,1567,1571,1579,1583,1597,1601,1607,1609,1613,1619,1621,1627,1637,1657,1663,1667,1669,1693,1697,1699,1709,1721,1723,1733,1741,1747,1753,1759,1777,1783,1787,1789,1801,1811,1823,1831,1847,1861,1867,1871,1873,1877,1879,1889,1901,1907,1913,1931,1933,1949,1951,1973,1979,1987,1993,1997,1999,2003,2011,2017,2027,2029,2039,2053,2063,2069,2081,2083,2087,2089,2099,2111,2113,2129,2131,2137,2141,2143,2153,2161,2179,2203,2207,2213,2221,2237,2239,2243,2251,2267,2269,2273,2281,2287,2293,2297,2309,2311,2333,2339,2341,2347,2351,2357,2371,2377,2381,2383,2389,2393,2399,2411,2417,2423,2437,2441,2447,2459,2467,2473,2477,2503,2521,2531,2539,2543,2549,2551,2557,2579,2591,2593,2609,2617,2621,2633,2647,2657,2659,2663,2671,2677,2683,2687,2689,2693,2699,2707,2711,2713,2719,2729,2731,2741,2749,2753,2767,2777,2789,2791,2797,2801,2803,2819,2833,2837,2843,2851,2857,2861,2879,2887,2897,2903,2909,2917,2927,2939,2953,2957,2963,2969,2971,2999,3001,3011,3019,3023,3037,3041,3049,3061,3067,3079,3083,3089,3109,3119,3121,3137,3163,3167,3169,3181,3187,3191,3203,3209,3217,3221,3229,3251,3253,3257,3259,3271,3299,3301,3307,3313,3319,3323,3329,3331,3343,3347,3359,3361,3371,3373,3389,3391,3407,3413,3433,3449,3457,3461,3463,3467,3469,3491,3499,3511,3517,3527,3529,3533,3539,3541,3547,3557,3559,3571,3581,3583,3593,3607,3613,3617,3623,3631,3637,3643,3659,3671,3673,3677,3691,3697,3701,3709,3719,3727,3733,3739,3761,3767,3769,3779,3793,3797,3803,3821,3823,3833,3847,3851,3853,3863,3877,3881,3889,3907,3911,3917,3919,3923,3929,3931,3943,3947,3967,3989,4001,4003,4007,4013,4019,4021,4027,4049,4051,4057,4073,4079,4091,4093,4099,4111,4127,4129,4133,4139,4153,4157,4159,4177,4201,4211,4217,4219,4229,4231,4241,4243,4253,4259,4261,4271,4273,4283,4289,4297,4327,4337,4339,4349,4357,4363,4373,4391,4397,4409,4421,4423,4441,4447,4451,4457,4463,4481,4483,4493,4507,4513,4517,4519,4523,4547,4549,4561,4567,4583,4591,4597,4603,4621,4637,4639,4643,4649,4651,4657,4663,4673,4679,4691,4703,4721,4723,4729,4733,4751,4759,4783,4787,4789,4793,4799,4801,4813,4817,4831,4861,4871,4877,4889,4903,4909,4919,4931,4933,4937,4943,4951,4957,4967,4969,4973,4987,4993,4999,5003,5009,5011,5021,5023,5039,5051,5059,5077,5081,5087,5099,5101,5107,5113,5119,5147,5153,5167,5171,5179,5189,5197,5209,5227,5231,5233,5237,5261,5273,5279,5281,5297,5303,5309,5323,5333,5347,5351,5381,5387,5393,5399,5407,5413,5417,5419,5431,5437,5441,5443,5449,5471,5477,5479,5483,5501,5503,5507,5519,5521,5527,5531,5557,5563,5569,5573,5581,5591,5623,5639,5641,5647,5651,5653,5657,5659,5669,5683,5689,5693,5701,5711,5717,5737,5741,5743,5749,5779,5783,5791,5801,5807,5813,5821,5827,5839,5843,5849,5851,5857,5861,5867,5869,5879,5881,5897,5903,5923,5927,5939,5953,5981,5987,6007,6011,6029,6037,6043,6047,6053,6067,6073,6079,6089,6091,6101,6113,6121,6131,6133,6143,6151,6163,6173,6197,6199,6203,6211,6217,6221,6229,6247,6257,6263,6269,6271,6277,6287,6299,6301,6311,6317,6323,6329,6337,6343,6353,6359,6361,6367,6373,6379,6389,6397,6421,6427,6449,6451,6469,6473,6481,6491,6521,6529,6547,6551,6553,6563,6569,6571,6577,6581,6599,6607,6619,6637,6653,6659,6661,6673,6679,6689,6691,6701,6703,6709,6719,6733,6737,6761,6763,6779,6781,6791,6793,6803,6823,6827,6829,6833,6841,6857,6863,6869,6871,6883,6899,6907,6911,6917,6947,6949,6959,6961,6967,6971,6977,6983,6991,6997,7001,7013,7019,7027,7039,7043,7057,7069,7079,7103,7109,7121,7127,7129,7151,7159,7177,7187,7193,7207,7211,7213,7219,7229,7237,7243,7247,7253,7283,7297,7307,7309,7321,7331,7333,7349,7351,7369,7393,7411,7417,7433,7451,7457,7459,7477,7481,7487,7489,7499,7507,7517,7523,7529,7537,7541,7547,7549,7559,7561,7573,7577,7583,7589,7591,7603,7607,7621,7639,7643,7649,7669,7673,7681,7687,7691,7699,7703,7717,7723,7727,7741,7753,7757,7759,7789,7793,7817,7823,7829,7841,7853,7867,7873,7877,7879,7883,7901,7907,7919,7927,7933,7937,7949,7951,7963,7993,8009,8011,8017,8039,8053,8059,8069,8081,8087,8089,8093,8101,8111,8117,8123,8147,8161,8167,8171,8179,8191,8209,8219,8221,8231,8233,8237,8243,8263,8269,8273,8287,8291,8293,8297,8311,8317,8329,8353,8363,8369,8377,8387,8389,8419,8423,8429,8431,8443,8447,8461,8467,8501,8513,8521,8527,8537,8539,8543,8563,8573,8581,8597,8599,8609,8623,8627,8629,8641,8647,8663,8669,8677,8681,8689,8693,8699,8707,8713,8719,8731,8737,8741,8747,8753,8761,8779,8783,8803,8807,8819,8821,8831,8837,8839,8849,8861,8863,8867,8887,8893,8923,8929,8933,8941,8951,8963,8969,8971,8999,9001,9007,9011,9013,9029,9041,9043,9049,9059,9067,9091,9103,9109,9127,9133,9137,9151,9157,9161,9173,9181,9187,9199,9203,9209,9221,9227,9239,9241,9257,9277,9281,9283,9293,9311,9319,9323,9337,9341,9343,9349,9371,9377,9391,9397,9403,9413,9419,9421,9431,9433,9437,9439,9461,9463,9467,9473,9479,9491,9497,9511,9521,9533,9539,9547,9551,9587,9601,9613,9619,9623,9629,9631,9643,9649,9661,9677,9679,9689,9697,9719,9721,9733,9739,9743,9749,9767,9769,9781,9787,9791,9803,9811,9817,9829,9833,9839,9851,9857,9859,9871,9883,9887,9901,9907,9923,9929,9931,9941,9949,9967,9973}