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1 String matching

1.1 Knuth-Morris-Pratt

Find all positions (*0-based indexes*) where a pattern p is present in text t

```
1  vector<int> kmp(string text, string pattern){
2      int m = pattern.size() , n = text.size();
3      vector<int> T(m + 1, -1), matches;
4      if(m == 0){
5          matches.push_back(0);
6          return matches;
7      }
8      for(int i = 1; i <= m; i++){
9          int pos = T[i - 1];
10         while(pos != -1 && pattern[pos] != pattern[i - 1])
11             pos = T[pos];
12         T[i] = pos + 1;
13     }
14     int tp = 0, pp = 0;
15     while(tp < n){
16         while(pp != -1 && (pp == m || pattern[pp] != text[tp]))
17             pp = T[pp];
18         pp++;
19         tp++;
20         if(pp == m)
21             matches.push_back(tp - m);
22     }
23     return matches;
24 }
```