```
1  # Xiang Jerry He
2  # lab 3
3  from itertools import izip, count
4  mat = lambda x, y: x == y and (1) or (-1)
5  g = -2
6
7  def globalAlign(seq1, seq2):
8      lenSeq1 = len(seq1)
9      lenSeq2 = len(seq2)
10     table = [[0]*(lenSeq1+1) for i in xrange(lenSeq2+1)]
11     trace = [[None]*(lenSeq1+1) for i in xrange(lenSeq2+1)]
12     for i in xrange(lenSeq2+1):
13         table[i][0] = -2*i
14     for j in xrange(lenSeq1+1):
15         table[0][j] = -2*j
16
17     for i in xrange(1, lenSeq2+1):
18         for j in xrange(1, lenSeq1+1):
19             maxindex = 0
20             maxvalue = table[i-1][j-1]-1
21             dir = ["up", "left", "upleft"]
22             for (index, val) in izip(count(), [table[i-1][j-1] + mat(seq2[i-1],
    seq1[j-1]),
23                                        table[i-1][j] + g,
24                                        table[i][j-1] + g]):
25                 if val >= maxvalue:
26                     maxindex = index
27                     maxvalue = val
28
29             table[i][j] = maxvalue
30             trace[i][j] = dir[maxindex]
31
32     return recurPrint(table, trace, seq2, seq1)
33
34
35
36 def recurPrint(table, trace, seq2, seq1):
37     lastSeq2 = len(seq2)
38     lastSeq1 = len(seq1)
39     seq2list = [None]*(lastSeq2+lastSeq1)
40     seq1list = [None]*(lastSeq2+lastSeq1)
41     while((lastSeq2 > 0) and (lastSeq1 > 0)):
42         dir = trace[lastSeq2][lastSeq1]
43         if dir == 0:
44             seq2list[lastSeq2-1] = seq2[lastSeq2-1]
45             seq1list[lastSeq1-1] = seq2[lastSeq1-1]
46             lastSeq2 -= 1
47             lastSeq1 -= 1
48         elif dir == 1:
49             seq2list[lastSeq2-1] = seq2[lastSeq2-1]
50             seq1list[lastSeq1 - 1] = "-"
51             lastSeq2 -= 1
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52              elif dir == 2:
53                  seq1list[lastSeq1-1] = seq1[lastSeq1-1]
54                  seq2list[lastSeq2 - 1] = "-"
55                  lastSeq1 -= 1
56          print seq1list
57          print seq2list
58          return table
59
60
61
62  def localAlign(seq1, seq2):
63          pass
64
65  def semiglobalAlign(seq1, seq2):
66          lenSeq1 = len(seq1)
67          lenSeq2 = len(seq2)
68          table = [[0]*(lenSeq1+1) for i in xrange(lenSeq2+1)]
69          # first row column already initialized to 0
70
71
72  if __name__=="__main__":
73          print globalAlign("vintner", "writers")
74
75
```