22BIO211: Intelligence of Biological Systems - 2

Lab Sheet 5

1. Cyclic Peptide Scoring Problem

Compute the score of a cyclic peptide against a spectrum.

Given: An amino acid string Peptide and a collection of integers Spectrum.

Return: The score of Peptide against Spectrum, Score(Peptide, Spectrum).

Sample Dataset

NQEL

0 99 113 114 128 227 257 299 355 356 370 371 484

Sample Output

11

2. Spectral Convolution Problem

Compute the convolution of a spectrum.

Given: A collection of integers Spectrum.

Return: The highest *m* elements in the convolution of Spectrum in decreasing order of their multiplicities. If an element has multiplicity k, it should appear exactly k times.

Sample Dataset

0 113 114 128 129 227 242 242 257 355 356 370 371

Sample Output

	""	L	N	Q	E	LN	NQ	EL	QE	LNQ	ELN	QEL	NQE
	0	113	114	128	129	227	242	242	257	355	356	370	371
0													
113	113												
114	114	1											
128	128	15	14										
129	129	16	15	1									
227	227	114	113	99	98								
242	242	129	128	114	113	15							
242	242	129	128	114	113	15							
257	257	144	143	129	128	30	15	15					
355	355	242	241	227	226	128	113	113	98				
356	356	243	242	228	227	129	114	114	99	1			
370	370	257	256	242	241	143	128	128	113	15	14		
371	371	258	257	243	242	144	129	129	114	16	15	1	
484	484	371	370	356	355	257	242	242	227	129	128	114	113

113 - 8 , 114-8, 128-8, 129-8

3. The Change Problem : Recursive Solution

Find the minimum number of coins needed to make change.

Given: An integer money and an array Coins of positive integers.

Return: The minimum number of coins with denominations Coins that changes money.

Sample Dataset

40

1,5,10,20,25,50

Sample Output

2

20 , 20

4. The Change Problem : Dynamic Programming Solution

Find the minimum number of coins needed to make change.

Given: An integer money and an array Coins of positive integers.

Return: The minimum number of coins with denominations Coins that changes money.

Sample Dataset

40

1,5,10,20,25,50

Sample Output

2

20 , 20