Assignment 8_2021-batch

1. An RNA sequence is formed by the nucleotides 'A', 'C', 'G', and 'U'. A triplet of nucleotides in such a sequence is called a codon and a protein coding gene is characterized by a start codon and a stop codon. Write a program that takes an RNA string as input and prints the codons present in the sequence. For example, for the sequence given below
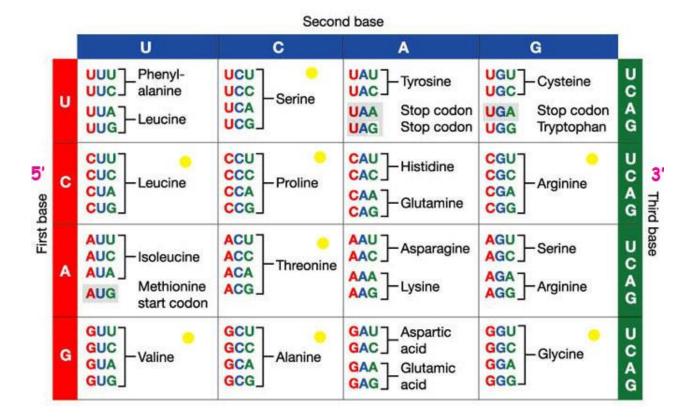Input: AUGGGAACUUCACUACGUAAAUAG
Output: Codons are: AUG, GGA, ACU, UCA, CUA, CGU, AAA, UAG

64 codons are possible since there are 4*4*4=64 ways of forming a triplet out of a 4-letter alphabet. Determine the frequency (#times a codon appears/Total #codons in the sequence) of each of the 64 codons in the input sequence. For example, freq_AUG = 1/8 in above eg.

2. Given a genetic code (see image below), i.e., a mapping between codons and amino acids, a coding sequence like the RNA sequence given above can be translated into an amino acid sequence. Using a dictionary like the one specified in slide 76 of the updated lecture slides, convert a protein coding mRNA sequence input by the user into an amino acid sequence.

Input mRNA sequence: AUGGGAACUUCACUACGUAAAUAG
Output: MGTSLRK (where M,G,.....,K are amino acids associated with codons AUG, GGA,...,AAA)

Note that the last codon in an mRNA sequence is either UAA or UAG or UGA which are stop codons that are not translated into an amino acid. As in the above example, when such a codon is encountered, translation should be terminated.

You can use the following 1-letter code for amino acids to specify the values associated with the keys (which are codons) in your dictionary.

Alanine	A
Arginine	R
Asparagine	N
Aspartic Acid	D
Cysteine	C
Glutamic Acid	E
Glutamine	Q
Glycine	G
Histidine	H
Isoleucine	I
Leucine	L
Lysine	K
Methionine	M
Phenylalanine	F
Proline	P
Serine	S
Threonine	T
Tryptophan	W
Tyrosine	Y
Valine	V

3. Write a program in python to input the radius of a sphere, and print the volume using formatted output corrected to 1, 2, 3 and 4 decimal places.

4. Use try, except to check if an inputted number is non-negative or not and for the former print the sqrt in a format with 3 places after decimal; for the negative case print an appropriate message in the except block. (Watch the video on error-handling in Python by Dr. Dwaipayan Roy before attempting this question!)