

## Assignment #1

1. Suppose we have the following DNA sequence:

5'-ATGGCCTCCAAGTCGATTGGAATTGCC-3'

- (a) What is the length of this sequence, i.e. how many bases does this sequence have? 1 pt
- (b) Write the complementary sequence in 5' to 3' order. 2 pts
- (c) Assuming the sequence listed above (5'-ATGGCCTCCAAGTCGATTGGAATTGCC-3') is the sense strand of the DNA sequence, what will the corresponding RNA sequence be? 2 pts
- (d) Convert the RNA sequence to a protein sequence. 3 pts  
You can assume that the first nucleotide in the above DNA sequence is known to be the first nucleotide in a codon. You can assume that all nucleotides are used as codons in the mRNA sequence. Use the genetic code in the notes.
- (e) How many different DNA sequences could give us the same protein sequence as the one above? **Explain your answer in detail.** 7 pts

2. If we change the Adenine at position 11 to a Thymine, how will your answers to parts (b)-(e) change? 10 pts

- (b) complementary sequence:  
(c) RNA:  
(d) Protein:  
(e) Number of DNA sequences, explanation:

3. Suppose we delete the Adenine at position 11; how will your answers to parts (b)-(e) change? 10 pts

- (b) complementary sequence:  
(c) RNA:

- (d) Protein:  
(e) Number of DNA sequences, explanation:

4. Suppose we have a DNA sequence 5'-ATGGCCTCCAAGTCGATTTGGAATTGCC-3' and we do not know where the codons start in this sequence and neither do we know whether this sequence is the sense strand – i.e. the reverse complement may be the coding sequence. How many DNA sequences could code for the same protein sequence that this sequence codes for? The answer does not depend on the presence or absence of start or stop codons.

8 pts

Explain your answer.

5. Start with something like the following Python program:

7 pts

```
#  
# Names:  
# Python program with string comparison  
#  
# a pair of strings  
x = "ATGCT"  
y = "ATGCCA"  
#  
# compare x and y
```

and modify it to always prints the message “**x and y are not equal**” unless x and y are actually the same – test your program by modifying the sequences for each time you run it. Add comments at the top of the Python file after the first line where you include the names of all the people in your group in the.

Submit your answers as a single document (you can edit this document to include the names of your group members) and a .py file for question 5.