

Micro 260 Spring 10

Name: _____

This assignment will be graded as a total as a total percentage correct of **50 points**.

$$((\text{Total points} - X) / \text{Total points}) * 50 = \text{final points}$$

1) What is a genome (2 pts)? _____

2) Are all genomes the same? Explain (2 pts). _____

3) What is a gene? Provide both the classical and modern definitions for a gene. (4 pts)

4) Roughly (\pm), how many genes and chromosomes are in an *E.coli* genome? (2 pts) _____

5) Draw a nucleotide, labeling the 3 parts. (deoxyribose, nitrogenous base, phosphate).

Number the carbons on the dexoyribose 1-5. (8 pts)

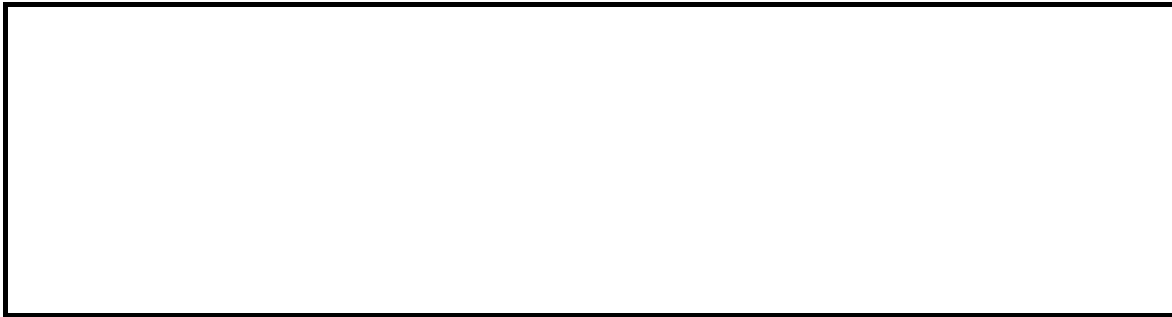
6) What type of bonds hold complementary bases together? (1 pt)

7) What are complementary bases? (2 pts)

8) Do purines bind with each other or with pyrimidines? Why or why not - Explain. (3 pts)

9) Draw a double-stranded DNA molecule, 6 nucleotides long, with complementary bases using symbols A: adenine; C: cytosine; T: thymine; G: guanine
P: phosphorous
D: deoxyribose

Write out in a horizontal fashion to fit the paper (Reference question 26) (6 pts)



10) Are the bases that make up DNA the same as found in RNA? (2 pts)

11) If a bacterial cell was deficient in DNA polymerase I, would you expect greater or fewer mutations? _____ Explain your answer. (4 pts) _____

12) How many complete strands would be formed at the end of DNA replication if a cell lacked ligase activity? (2 pts)

13) Does DNA polymerase require a **3' OH to** produce DNA from RNA primer? (1 pts)

b. Why is this carbon positional arrangement important for initiating DNA synthesis? (2 pts)

14) Why is DNA synthesized with a leading and a lagging strand? (3 pts)

15) A) What is the rolling circle model of DNA synthesis? B) Describe how DNA replicates using this method (3 pts)

16) How is the information found in genes (in DNA) used to make a protein? (2 pts)

17) How is RNA different from DNA? Give 3 specific differences. (6 pts)

a. _____

b. _____

c. _____

18) What are the three stages of transcription and what happens during each? (9 pts)

Stage of Transcription	Activity

19) What are the various types of RNA found in a cell, what are their respective functions? (18 pts)

Type of RNA	Brief Description

20) What are the 3 stages of ribosomal polypeptide synthesis? (3 pts)

a. _____

b. _____

c. _____

21) What is a codon? How many ribonucleotide sequences make up a codon? (4 pts)

b. What is an anticodon? How many ribonucleotide sequences make up an anticodon? (4pts)

c. How many hydrogen bonds are found in a codon sequence of "AUG?" (2pts) _____

22) Draw the major steps in transcription.

Label the coding strand, template strand of DNA, RNA polymerase, direction of transcription and the growing mRNA transcript. Demonstrate a proposed method of RNA is terminated upon completion of DNA copying (**Hint:** draw a single strand of DNA then draw the corresponding RNA to that DNA) (12 pts)

24) Why is the genetic code of mRNA codons considered universal? (4 pts)

b. Are there exceptions? Explain.

25) Draw and label the components that make up a ribosome, with an mRNA molecule attached. Include the A and P sites filled and orientation of the mRNA. (8 pts)

26) The following sequence of letters represents the base pairs for $\frac{1}{2}$ a DNA strand. Give the sequence of letters on the DNA complementary half. (4 pts)

3' T - A - C - G - G - C - T - G - C - T - C - A - A - G - T - C - A - C - G - G - C 5'
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

- b. From the sequence that was provided above (not the one you wrote), give the sequence of letters for mRNA. (2 pts)
- c. From the mRNA that you wrote in the above section, give the anticodons sequence of matching tRNA molecules. (2 pts)
- d. A chart has been provided. From the chart, name the amino acid sequence coded by the series of steps above. (2 pts)
- e. What happens to the polypeptide if a point mutation arises in the 14th DNA base replacing G with T? (2 pts)
- f. What happens to the polypeptide if a point deletion of a DNA base occurs at the 14th DNA base? (2 pts)

- h. What would be the minimum number Ribonucleotides bases would be required to construct a protein of 210 amino acids? (2 pts)

27) What is a polyribosome? (2 pts) _____

28) Organizing Your Knowledge

Describe the purpose (22pts)

Enzyme, Protein or Factor	Purpose	Is “U” Involved in this process?
helicase		
RNA primer		
DNA polymerase I		
DNA polymerase III		
ligase		
gyrase (helicase)		
RNA polymerase		
ribosomal complex		
codons		
Anticodons		