Printed Name _____

BICH/GENE 431, EXAM 3, Wednesday, April 21, 2010, 100 points total

You MUST sign the following academic integrity statement:
On my honor, I have neither given nor received unauthorized aid on this academic work.

Signed: _____

1. Write your name on the cover page ONLY.
2. Write your student UID# on ALL pages. If you do not remember your UID#, make up a random 8 digit number. DO NOT use your social security number.
3. Write concise answers to demonstrate effectively your mastery of the subject. In order to obtain maximum credit, you need to show your work.

Exam 3 Score _____

1) (5 pts) On the cloverleaf structure of tRNA shown below, identify the major features.
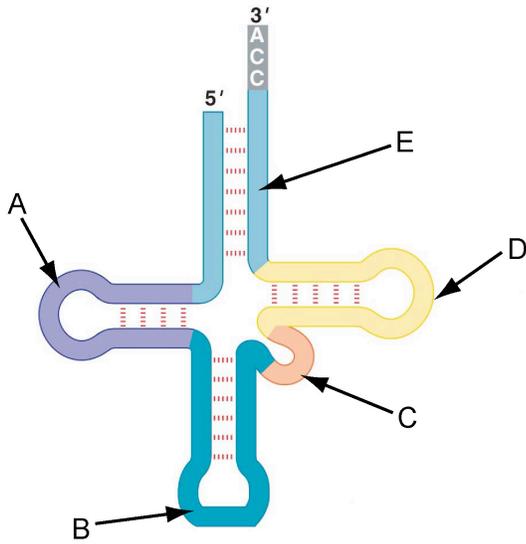
A. _____

B. _____

C. _____

D. _____

E. _____

2) (16 pts) Role of GTP hydrolysis in bacterial protein synthesis
   A) (12 pts) Describe the precise steps in bacterial translation that involve the hydrolysis of GTP (not ATP, and not including ribosome recycling).
   B) (4 pts) How many GTP molecules would be required to synthesize a 100 amino acid polypeptide chain in E. coli (not including ATP hydrolysis, not including ribosome recycling)?

3) (10 pts) A portion of the genetic code is shown.
  A)(8 pts) Bearing in mind the wobble rules, write the smallest set of <u>anticodon</u> sequences (5' to 3' direction) present in tRNAs that would be necessary to read these codons.
  B)(2 pts) How many different tRNA molecules would be needed to recognize these codons for the combined initiation and elongation phases of translation?

	U	
U	UUU UUC	Phe
	UUA UUG	Leu
C	CUU CUC CUA CUG	Leu
A	AUU AUC AUA	Ile
	AUG†	Met
G	GUU GUC GUA GUG	Val

4) (8 pts) Draw the E. coli tryptophan operon leader RNA showing the sequence and structural components that are involved in attenuation.

5) (15 pts) Predict which outcome would predominate (write "lytic", "lysogenic" or "no productive infection") after bacteriophage lambda infection with the following conditions or mutants. For full credit, you must justify your answers.

A) high [glucose]

B) lambda cIII null mutant

C) down mutation in lambda P_{RE}

D) mutant Cro with 10-fold higher affinity for operator DNA

E) ftsH (down) mutant host cell

6) (8 pts) Name four different types of DNA-binding domains found in eukaryotic transcription factors.

7) (4 pts) Name four different proteins or protein complexes that can be recruited by eukaryotic activator proteins.

8) (6 pts) Describe how methylated DNA in eukaryotes can lead to repressive chromatin.

9) (8 pts) Compare and contrast positive regulation at the E. coli lactose promoter versus the glnA promoter (used in nitrogen metabolism). Discuss the mechanisms used and activator proteins.

10) (5 pts) What is the histone code hypothesis?

11) (15 pts) Shorter answer questions
A) (2 pts) What is meant by a synergistic effect?

B) (4 pts) Give two examples of regulation of eukaryotic transcription at the level of elongation.

C) (3 pts) Name the three universal stop codons.

D) (2 pts) What does cycloheximide inhibit?

E) (2 pts) What is the function of yeast Gal80 protein?

F) (2 pts) Which ribosomal subunit carries the peptidyl transferase activity?