Spring 2008 Biology 111 Exam #2.5 - Molecular Genetics Take-Home Exam

There is no time limit on this test, though I have tried to design one that you should be able to complete within 1 hour, except for typing. You are not allowed to use your notes, old tests, any electronic sources (except as directed by this exam), any books, nor are you allowed to discuss the test with anyone until all exams are turned in by 12:30 am on Friday March 28. **EXAMS ARE DUE AT THE START OF CLASS ON FRIDAY MARCH 28**. You may use a calculator and/or ruler. The **answers to the questions must be typed on a separate sheet of paper** unless the question specifically says to write the answer in the space provided. If you do not write your answers on the appropriate pages, I may not find them unless you have indicated where the answers are. There are 3 pages to this exam, including this cover sheet.

- 3 pts if you do not follow this direction.
Please do not write or type your name on any page other than this cover page. Staple all your pages (INCLUDING THE TEST PAGES) together when finished with the exam.

Name (please print):

Write out the full pledge and sign:

How long did this exam take you to complete (excluding typing)?

6 pts.
1) Go to this web site: <www.expasy.org> which is a European protein database. Search for the term Q16134.
a. From what species did this come?
b. What is the name of the protein (not its symbol).
c. Draw a topology picture of the protein. (hand drawn or computer drawn)
d. Label all the features of this protein. Print neatly!!
e. Where in the cell is this protein located?

9 pts.
2) Two individuals mate: gg hh rr *X* Gg Hh Rr
g = green skin; G = normal skin color
h = two hearts; H = one heart
r = rabbit ears; R = normal ears
They have a lot of offspring:

Skin color	Heart	Ears	Number
Normal	One	Rabbit	334
Green	Two	Normal	338
Green	One	Rabbit	2
Normal	Two	Normal	3
Green	Two	Rabbit	15
Normal	One	Normal	14
Normal	Two	Rabbit	46
Green	one	Normal	48

Determine:
a. the order of loci,
b. the distance between each locus, and
c. which alleles were linked in the original parent.
You must show your math work to get any partial credit.

6 pts.
3) Go to the BLAST web site <http://www.ncbi.nlm.nih.gov/blast/Blast.cgi>. Search for this protein: `GNAAAAKKGSEQESVKEFLAKAKEDFLKKWESPAQNTAHLDQFERIKTLGTGSFGRVMLVKHKETGNHY .`

a. What natural protein did you find?

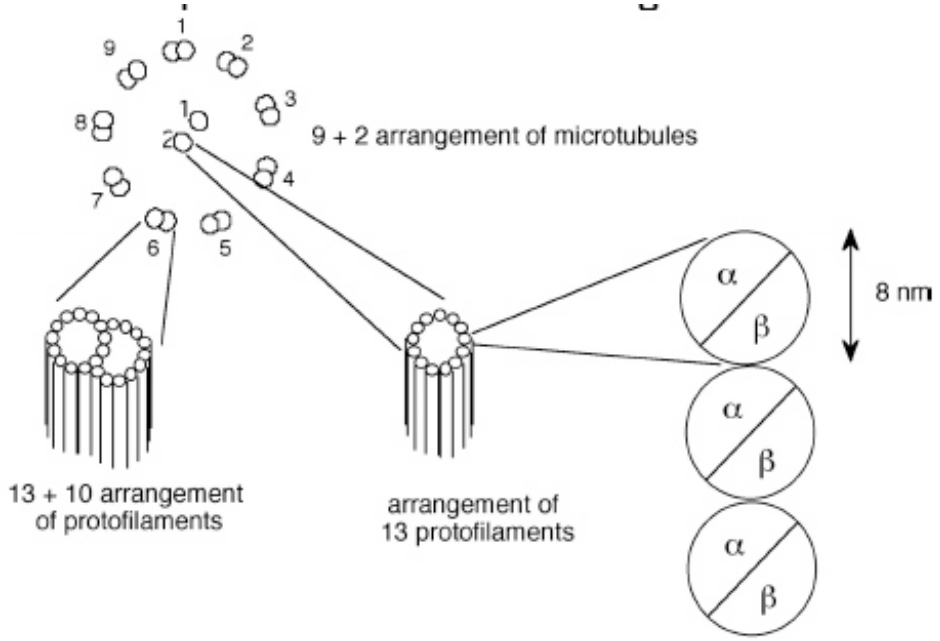
b. Is it associated with any diseases or pathogens?

c. Explain your answer to part b above in two sentences or less.

6 pts.
4) a. If *Chlamydomonas* flagella grew 4 microns in 20 minutes, how many amino acids are being

added to the flagella every minute? Keep in mind that α and β tubulin are each 450 amino acids long. (type your work if you want partial credit)

b. How many <u>nucleotides</u> are consumed to produce these proteins if you only count the energy used to charge tRNA and assemble the amino acids? (show your work in type written format)



8 pts.

5) Find an online, credible description of an X-linked disease other than hemophilia, muscular dystrophy, or color blindness. Give me:

a. The URL you used

b. Name of disease

c. Name of gene

d. List its chromosomal location

d. Draw a family pedigree that by the third generation produces one girl and two boys, one of whom has the disease you identified.