Fall 2009 Genomics Exam #2
Sequence Variations and Microarrays

There is no time limit on this test, though I don't want you to spend too much time on it. I have tried to design an exam that will take much less time that exams in the past. You do not need to read any additional papers other than the ones I send to you. There are 3 pages, including this cover sheet, for this test. You are not allowed discuss the test with anyone until all exams are turned in by 11:30 am on Thursday November 5. **ELECTRONIC COPIES OF YOUR EXAM ANSWERS ARE DUE AT 11:30 am ON THURSDAY NOVEMBER 5**. You may use a calculator, a ruler, your notes, the book, and the internet. You may take it in as many blocks of time as you want. Submit your electronic versions before 11:30 am (eastern time zone:-). You will be penalized 1 letter grade for each 24 hour period your exam is submitted late.

The **answers to the questions must be typed in a Word file and emailed to me as an attachment**. Be sure to backup your test answers just in case (I suggest a thumb drive or other removable medium). You will need to capture screen images as a part of your answers which you may do without seeking permission since your test answers will not be in the public domain. Remember to explain your thoughts in your own words and use screen shots to support your answers. Screen shots without *your* words are worth very few points.

DO NOT READ or DOWNLOAD ANY NEW PAPERS FOR THIS EXAM. RELY ONLY ON THE FIGURES PROVIDED IN THIS EXAM, YOUR EXPERIENCE, AND YOUR SKILLS.

-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)?

20 points

1) Look at the paper by Simona Granata *et al*.

6 pts

a) Describe what figure 1 is telling you at the big picture level. Don't focus on individual genes, but tell me how to read this figure in general. Address the colors, the types of people and the dendrograms.

5 pts

b) Study the dendrogram in figure 1. Explain how they cut the tree to form the three groupings of patients and why this presents an interesting exception to the general trend presented.

9 pts

c) Study figure 3. Describe what processes are affected by the 11 genes highlighted in this paper and how these processes are affected for the patients in this study.

20 points (5 pts each)

2) Now look at the paper by Legoffic *et al*.

a) Explain what figure 1 is telling you. Use your own words, *not* quotes or paraphrases from the paper. You may find it easier to use a screen shot and draw annotations to the figure so I know what you are describing.

b) Summarize the main lessons you learn in figure 2?

c) What is the point of figure 3? Summarize the results for this figure.

d) How could the results for this paper be converted into clinically useful information? Support your answer by linking the data in the paper to the clinical application.

Identify the typo in figure2 for 2 bonus points.

30 points

3) Look at the paper by Kuntz-Melcavage *et al*.

7 pts.

a) Explain the experimental design for this paper using figure 1 to help you.

7 pts.

b) What very difficult social problem is this paper addressing? Utilize figure 1 when answering this question.

8 pts.

c) Make a list of the 6 genes in Figure 2. Provide a short (2 sentences or less) summary of each gene's function and then state what impact the experiment had on each gene's expression.

8 pts.

d) Which gene in figure 3 would be the one you would choose for possible therapeutic intervention. Explain why you chose your target gene.

30 points
4) Now look at the paper by Gry *et al*.
5 pts
a) Summarize the research question and experimental design of this paper in your own words. Use figure 1 to supplement your summary.
5 pts
b) Explain in words why the four genes in figure 2 have the correlation coefficients they do. I don't want you to describe the calculations, I want you to use the visual data to explain why a > b > c > d.
8 pts
c) Use the same source of protein information they used in this paper to show me (with screen shots) the cellular component of 4 proteins in figure 2. Furthermore, I want you to name 2 tissues that produce a lot of each protein and 2 tissues that produce very little or no detectable amounts of each protein.
4 pts
d) Explain the significant finding summarized in figure 4?
4 pts
e) Summarize the take home message in figure 5. Choose 2-3 cell types to use as examples in your summary. Please take a screen shot and draw an arrow pointing to your chosen genes in each tree.
4 pts
f) Describe the Y axis in figure 5, how it should be read, and why panel c has a different scale than panels a and b.