

Fall 2003 Genomics Exam #2
Genomic Medicine and Sequencing Tools

There is no time limit on this test, though I don't want you to spend too much time on this. You know I work hard to design challenging tests, but not ones that are excessive. You do not need to read any additional papers other than the ones I send to you. There are three pages for this test, including this cover sheet. You are not allowed discuss the test with anyone until all exams are turned in at 11:30 am on Friday November 7.

EXAMS ARE DUE AT CLASS TIME ON FRIDAY NOVEMBER 7. 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 need to. **NOTE: I WILL BE OUT OF TOWN NOV. 4-9 SO DO NOT WAIT TO ASK ME QUESTIONS.**

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. 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. Print this test but make sure the screen shots are big enough to be seen easily. Turn in the hard copy by the deadline to Mrs. Hartsell in the Biology Office or slide your test under my door.

Suggestion: Start with the MAGIC Tool problem first while I am still in town. This will allow you to ask questions before I fly to Hungary (no email access for me)

-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)?

25 pts.

1) Go to this web site <www.bio.davidson.edu/courses/genomics/Exams/2003/QTL.pdf>. Read the abstract to get a general sense of this paper's findings. You do not have to understand this paper completely to accomplish your task.

Task: Summarize this paper using your own words and not quotes from the original paper. Each time you make a statement in your summary, support your statement with a figure. You should describe how the figure you have chosen supports your statement. The goal is to write a user-friendly version of the abstract with figures to support the claims.

25 pts.

2) This question requires you to use MAGIC Tool. Launch MAGIC Tool properly so you can get the full RAM capacity by using MAGIC_launch.

a. Download these two tiff files:

<http://gcat.davidson.edu/MAGIC/exam2_red.tif>

<http://gcat.davidson.edu/MAGIC/exam2_green.tif>

b. Download the gene list

<http://gcat.davidson.edu/MAGIC/genelists/examGene_List.txt>.

c. Address and grid all four grids. The description for addressing the grids can be found here: <www.bio.davidson.edu/projects/GCAT/workshop.html> under the heading "Addressing these data". You have been given a subset of the files used in this workshop, but the printing pattern is the same as shown in the screen shot.

d. Produce a single expression file that includes these four grids measured eight ways:

fixed circle average

fixed circle total

fixed circle average background subtracted

fixed circle total background subtracted

adaptive circle average

adaptive circle total

adaptive circle average background subtracted

adaptive circle total background subtracted

e. View the unclustered expression profiles of these genes measured all 8 ways.

f. Identify any genes that appear to vary in their expression by a substantial amount when measured by one of these 8 ways. Name the genes you have identified and provide me with a screen shot of this graph showing the outliers.

g. Go back to one of the spots you identified in f above and get a screen shot of this spot.

h. Explain why this spot was an outlier by one or more ways of measuring the ratios.

The remaining questions all take advantage of the Open Access permitted through Public Library of Science (PloS). It also focuses on the life cycle of the parasite *Plasmodium*.

To help you interpret figures from this paper, you might want to visit

<<http://malaria.ucsf.edu/Figures.php>> if you want to change from red/green to

yellow/blue. You do not have to understand the entire paper in order to answer these questions, but I strongly recommend you read the whole paper.

30 pts.

3) Download this paper <<http://malaria.ucsf.edu/paper.php>>.

- a. Summarize what is happening to the *Plasmodium* parasite by general category from figure 2. Pay special attention to panels B-M. You don't need to describe in great detail, just summarize the main activity that is tied to the life cycle of *Plasmodium*.
- b. What does this paper say about isozyme expression?
- c. Summarize figure 3A and 3C.
- d. Summarize figure 4A.
- e. Summarize figure 5.

20 pts.

4) Go to this interactive dataset <<http://malaria.ucsf.edu/>>. Get familiar with this interface. You should not need to use the tutorial so try to figure it out by yourself if you can (just to save time for most). However, you may use the tutorial if you want.

- a. Show me the expression profile (both ways of visualizing it) for one of the known seven vaccine candidate proteins. I want the image that looks similar to figure 1 E. You can choose which one to display. Be sure and tell me which gene you chose.
- b. Screen shot a list with expression profiles of the 6 genes with the greatest fold change in expression between induction and repression that would make good candidates for vaccines. Validate your choices by identifying at least two known candidate vaccine genes described in the paper. To validate, list the names of all the genes you selected and explain how you homed in on your genes.

3 Bonus Points: submit some constructive feedback to the authors of this web database. To get the points, you must show me a readable screen shot of your comments.