Assignment #11

Due on Wednesday, April 14, 2010

Read Chapter 6 on *Modeling Bacterial Resistance* in the class lecture notes, starting on page 65, at `http://pages.pomona.edu/~ajr04747/`

Read on *Probability Distributions in Genetics* in Allman and Rhodes (pp. 228–237).

Do the following problems

1. Problem 6.2.5 on page 238 in Allman and Rhodes.

2. Problem 6.2.6 on page 238 in Allman and Rhodes.

3. Problem 6.2.16 on page 240 in Allman and Rhodes.

4. Problem 6.2.18 on pages 240 and 241 in Allman and Rhodes.

5. The data in Table 1 were taken from page 504 of the Luria and Delbrück 1943 paper.

   Table 1: Number of resistant bacteria in a series of similar cultures

Test–tube #	1	2	3	4	5	6	7	8	9	10	11	12
# of Mutants	1	0	0	7	0	303	0	0	3	48	1	4

   For the data in Table 1:

   (a) Estimate the average number of resistant bacteria right before the plating was made.

   (b) Use the *sample–variance* formula $s^2 = \dfrac{\sum_{i=1}^{n}(r_i - \overline{r})^2}{n-1}$, where r_i denotes the number of resistant cells in test–tube i and $\overline{r}$ is the average number of resistant bacteria, to estimate the variance of the distribution.

   (c) Based on your results in the previous part and what you know about the Poisson process, would you say that the number of resistant bacteria follows a Poisson process? Justify your answer.