HOMEWORK # 2: APRIL 9, 1998

TO BE HANDED IN ON APRIL 16, 1998

1. Pike (1966) gives results of a laboratory experiment concerning vaginal cancer in female rats. In one experiment 19 rats were painted with the carcinogen DMBA, and the number of days Y until the appearance of a carcinoma was the variable of interest. At the time the data were collected only 17 out of the 19 rats had developed a carcinoma, so that two of the times below (marked *) are censoring times. The times were given in days

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143,164,188,188,190,192,206,209,213,216,
220,227,230,234,246,265,304,216*,244*
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   (a) Calculate the product-limit estimate of the survival function. Estimate 5- and 7-month survival probabilities, using SAS.

   (b) Group the data into a life table with 3-month intervals. Compare the 5- and 7-month survival probability estimates with those obtained in part (1), using SAS and without using SAS. Does the assumption make in calculating the life table estimate hold for this data set? and Why?

2. Leathem and Brooks (1987) conducted a study to evaluate a histochemical marker which discriminates between primary breast cancer that has metastasized and that which has not. The marker under the study was a lectin from the albumin glad of the Roman snail, known as Helix pomatia agglutinin, or HPA. The marker HPA binds to those breast cancer cells associated with metastasis to local lymph nodes, and the HPA stained cells can be identified by microscopic examination. We are interested in whether HPA staining can be used to predict the survival experience of women who present with breast cancer. The data given in the following data refer to the survival times in months of women who had received a simple or radical mastectomy to treat breast cancer between January 1969 and December 1971. In the table, the survival times of each women are classified according to whether their

tumor was positively or negatively stained. Censored survival times are labeled with an asterisk.

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              Survival times of women with tumors which were negatively
              or positively stained with HPA
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Negative staining                  Positive staining
   23                               5   68
   47                               8   71
   69                              10   76*
   70*                             13   105*
   71*                             18   107*
  100*                             24   109*
  101*                             26   113
  148                              26   116*
  181                              31   118
  198*                             35   143
  208*                             40   154*
  212*                             41   162*
  224*                             48   188*
                                   50   212*
                                   59   217*
                                   61   225*
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(a) Does a patient with a negatively stained HPA survives longer than a patient with a positively stained HPA? WHy? (solving this problem using SAS and without using SAS).

(b) Is log rank test or Wilxocon test better for testing survival distributional equality in this data set? Why?