

More sample questions:

- 1) I have a die with six faces
  - 1) how would I test the hypothesis that the die is fair?
- 2) I assume that radio news reports about the fiscal cliff appear with a Poisson distribution.
  - 1) How could I estimate the intensity,  $\lambda$ ?
  - 2) Assume you are given a value of  $\lambda$ . How could you test the hypothesis that this value correctly describes that poisson distribution?
- 3) Each member of a class is evaluated by a final score. You know the scores given for each homework, for midterm and for final. You wish to discover what weights were used to discover the final score. This is a regression problem.
  - 3) Very briefly, sketch how to solve it.
  - 4) You solve this problem, and discover that the residual vector  $e=y-X \hat{\beta}$  has non-zero entries. What conclusions could you draw?
- 4) In a regression problem, we write  $y$  for the vector of dependent variables,  $X$  for the matrix of data, which we assume has a column of ones in it,  $\beta$  for the coefficients and  $e$  for the residual ( $e=y-X\beta$ ).
  - 3) Show that  $e^T X=0$ , either by argument or algebraically.
  - 4) Show that  $e^T 1=0$ , where  $1$  is a vector of ones.