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 \( e = y - X \beta \) 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.