

Short Essay (3 topics)

(DUE: April 5)

View this mini-Essay (around 5 pages, 1.5 line spacing) as essentially the same as answering 2 questions as in previous assignments (you have all been treating them that way already!) only with the addition of an introductory background and some critical appraisal of your own—including self-criticism. Ideally, it will form part of a final paper for this class, but you are also free to find something entirely new for the final paper. You might connect themes from the reading questions (with at least one being different from those you've turned in).

This essay requires showing you understand and can synthesize some of the central philosophical issues we have discussed. It should combine some aspects of at least two of the seminar days. Since it is a philosophical essay, attention should be paid to clarifying key terms. Use direct quotes from the readings. Do not assume your audience is familiar with the concepts or arguments: show that you understand them. You can mix statistical examples and discussion to the degree that you wish. If none of the three broad headings seems apt, you may suggest another—but check with me first. You can send me tentative ideas or an outline in the next few days, or during my office hours. You will have a chance to revise your essay.

(1) Statistical inference and Scientific inference

Formal statistical methods should be evaluated, not in isolation, but in relation to the general conception of scientific inquiry and learning that they enable. A basic framework is given in the series of models, questions and problems depicted on SIST p. 87. Discuss the roles of statistical significance tests (of either the N-P or Fisherian variety) in relation to any one of the following—(1) the eclipse tests of GTR, (2) the Higgs discovery, (3) the discovery of prions, (4) Neyman's empirical justification for using empirical models, p. 111, together with the pest control example on p. 299.

How might one define severity in terms of problem solving? (Souvenir U).

In the final paper, you can make comparisons with Bayesian methods, and you also might wish to include an example from your field or outside interest.

(2) Statistical Inference and its Problems

This could be the start of a final paper on comparing the statistical methods and their problems that we've discussed in this seminar. It could also relate to a final paper comparing Neyman-Pearson, Fisherian and Bayesian approaches. For the short essay, direct yourself to the following:

Articulate the ingredients of statistical significance tests (you can limit yourself to p-values or include N-P tests) and address 1 or 2 of the *chestnuts and howlers* either from Excursion 3 Tour II, or the dispute about the interpretation of the Higgs' results and the term "probable flukes". There are also some on confidence intervals that we did not discuss that could arise in a final paper.

You can, alternatively, discuss points on Bayes factors from Excursion 4 Tour II, if we've gotten far enough by the time you write this.

(3) Statistical inference and testing assumptions of statistical and scientific models.

If you think you'd like to write a final paper in this area, here's how you can handle your short essay. Start with the 4 requirements we set out for demarcation (see assignment 2) and discuss two main issues from Excursion 4 Tour IV (e.g., 4.8 "all models are false" and 4.9 "For model checking they [Bayesians, some of them] come back to significance, m-s testing), and/or the presentation by Aris Spanos. I'm not looking for a formal discussion of m-s tests for this essay (although you can illustrate), but one that shows you understand its logic and assumptions. How can it avoid circularity? (Go back to convergent arguments from Excursion 1.)