Phil 160
Spring 2012

Midterm Exam Review Sheet

Important concepts and terminology:

theory
empiricism
rationalism
metaphysics
epistemology
analytic vs. synthetic statements
verifiability theory of meaning

deductive reasoning
inductive reasoning
the problem of induction
the narrow inductivist view of scientific inquiry
underdetermination
holism about testing
meaning holism
falsification
confirmation vs. corroboration
conjecture and refutation
"empirical content" or "observational consequences"
(You should also be able to explain the logic of hypothesis testing in Popper's account)

paradigm
normal science
puzzle-solving
anomaly
crisis
revolution
(You should also be able to describe the movement from normal science, to crisis, to revolution, to normal science in Kuhn's account)
incommensurability
Lakotos's research programs (hard core + protective belt)
progressive vs. degenerating research programs
acceptance vs. pursuit of theories
principle of tenacity
principle of proliferation

Questions about the reading (for material which is fair game for the midterm):

- Consider the claim, "All peaches are sweet." According to Hempel, is a claim like this *testable*? (If so, describe the testing procedure. If not, explain why not.) What would he say about whether this claim could be conclusively established?
- Explain why Popper thinks the problem of induction *isn't* a problem for the scientific method.
- What role does Kuhn think a paradigm plays in a normal science tradition?
- What does Kuhn identify as the key features of "puzzles"? How do features like these help organize the "puzzle-solving" work of scientific research?
- Explain why Kuhn thinks unsolved puzzles *don't* automatically lead to a change in scientific theory.
- What factors does Kuhn say scientists consider when choosing between paradigms?
- On p. 111, Kuhn writes, "… after a revolution scientists are responding to a different world." What does he mean by this? How does this relate to the inverting lenses experiment discussed on p. 112?
- What does Lakatos think is wrong with Kuhn's picture of science?
- What does Laudan think is wrong with Kuhn's picture of science?
- What does Feyerabend think is wrong with Kuhn's picture of science?

Sample midterm questions:
True or False:

1. Duhem claims that hypotheses are tested in groups because individual hypotheses in science hardly ever make testable predictions. TRUE FALSE
2. Lakatos claims that a scientist is committed to try to falsify all the hypotheses of her theory. TRUE FALSE
3. The logical empiricists claimed that for a statement to be meaningful, it must be easy to verify it decisively. TRUE FALSE

Fill in the blank:

1. Lakatos claims that the basic unit of scientific achievement is the _____, which consists of a hard core and a protective belt.

2. _____ claims that every genuine test of a theory is an attempt to falsify it.

3. A(n) _____ makes claims about what kind of stuff there is in the world (or in a particular piece of it) and describes how that stuff behaves.

4. Kuhn characterizes the activity of normal science as _____ .

5. A(n) _____ claim is one that is true or false just in virtue of the meanings of the terms in it rather than due to additional facts about the world.

research program

theory

synthetic

analytic

puzzle solving

experimentation

theoretical

Popper

Kuhn

Multiple choice:

1. Hempel criticizes the "narrow inductivist" view of science on the grounds that:
   A. It is not possible to collect *all* the facts about the world.
   B. In order to collect relevant data and develop meaningful classifications, scientists must be guided by working hypotheses.
   C. Induction is not an automatic process for generating generalizations from empirical data.
   D. All of the above.
   E. None of the above.

2. Popper's response to the problem of induction is:
   A. It makes it impossible for us to learn anything from experiments.
   B. It presents no challenge to science because inductive logic is just as trustworthy as deductive logic.
   C. It presents no challenge to science because theory and experiment are unrelated.
   D. Presents no challenge to science because ruling out a theory which makes a prediction that differs from the observed outcome relies on deductive logic.

SCIENTIFIC REASONING ITEM

The following case has been cited in support of the hypothesis that pyramids have special powers:

A young woman who was having difficulty with her complexion was told to keep a pitcher of water under a pyramid and then wash her face in that water, with only the mildest soap, once in the morning and once in the evening. She was also told to put nothing else on her face, no creams or medications of any kind and no makeup. Although she has been in the habit of using quantities of makeup, she agreed to the experiment. Within two weeks, there was a clearly noticeable improvement in her complexion.

Propose a method to test the hypothesis that the pyramid made a difference in improving the young woman's complexion.

What outcome to this test procedure would support the hypothesis?

What outcome to this test procedure would undermine this hypothesis?

Short answers (1 sentence):

1. Define "falsifiability".
2. Define "normal science".
3. Define "degenerating research program".
4. Describe the sort of information contained in a *theory*.

Medium answers (1 paragraph):

1. Briefly explain what Popper thinks defines a science.
2. According to Feyerabend, what is the distinctive scientific attitude?
3. Explain, using Lakatos' model of science, the difference between the "hard core" of a theory" and the "protective belt" of auxiliary hypotheses.
4. What is the problem of induction? Illustrate with a specific example.
5. According to Duhem, why can't science get by on logic alone?
6. Briefly explain the main difference between what Popper views as scientific activity and the "normal science" Kuhn describes.
7. What does Popper think we can say about a hypothesis which has survived efforts to falsify it, and why?
8. Given Popper's account, what kind of progress can science make? What kind of progress can we *not* expect science to make?
9. Given Kuhn's account, what kind of progress can science make? What kind of progress can we *not* expect science to make?

Midterm is in class, Thurs. Mar. 22, 2012
Closed book.
You may prepare and use a single page (8.5 by 11 inches, both sides) of notes.
You *don't* need to bring a blue book.