

Mid-term Examination (Version B)

General Directions: You are to answer a total of four of the following twelve questions. You must answer one question from each of the four areas. Your answers should be as complete as possible, given the time available.

Part I: The Scientific Enterprise

1. What is the main difference between rationalism and empiricism? Give at least one example of a thinker representing each view. In general terms, how has the argument between rationalism and empiricism gone up to our day?
2. Contrast realism and instrumentalism as points of view on the interpretation of scientific theories, giving examples of thinkers who held each view.
3. What is meant by the term, “the hypothetico–deductive view”?

Part II: Ancient and Modern Models of the Universe

4. Explain Aristotle’s view of the difference between natural and enforced motion. What kinds of causes are required to sustain the latter, according to Aristotle, and what are some of the peculiar consequences of this view?
5. Give a sketch of the three main devices that Ptolemy used to model the motions of the planets.
6. Before Brahe and Galileo began to produce observational evidence that could be used to support the Copernican model of the planetary system, what were the chief advantages and disadvantages of the Copernican system with respect to the Ptolemaic system?

Part III: The Newtonian Universe

7. Explain what is meant by the distinction between inertial mass and gravitational mass in Newtonian physics. What is problematic about asserting that they are identical?
8. Reproduce Newton’s proof that a planet whose motion satisfies Kepler’s third law must be moving under the influence of an inverse-square force.
9. In what sense can Newton be said to have destroyed the ancient distinction between the celestial and the terrestrial realms?

Part IV: A Perspective

10. Explain how the realism–instrumentalism debate played a role in Galileo’s clash with the Church over the Copernican system.
11. Explain how Roemer calculated the speed of light.
12. Why is it necessary to distinguish a physical theory’s being deterministic from its being able to give us stable predictions?