

Jan 19th, 2012

## P340: Homework Assignment No. 1

**DUE DATE: Friday, Feb 3rd., 2012**

Please note that late assignments will not be marked

(1) Write an essay, of roughly 800 words, which (i) very briefly recounts the Platonic idea of forms, and also some of the arguments of Aristotle against these; and (ii) expresses your own views on the existence of a 'supra-sensible' world, populated by abstract "Forms". This world is to be distinguished from the perceived world of which we are directly aware, although it is presumably related to it in some way. By far the most important part of your essay should be devoted to (ii), in which you give your own analysis of the question, and develop your own arguments - what is most important here is the quality of these arguments. Feel free to be creative in your use of examples.

(2) One of the apparent successes of the Epicycle theory was its explanation of the apparent retrograde motion of planets in the sky. Taking the planet Jupiter as an example,

(i) Show how Jupiter appears to move in the sky as seen from earth;

(ii) first explain in detail how the epicycle theory, in the later form developed by Ptolemy, was supposed to explain this. You should explain here first the simplest form of the epicycle theory, and then the more complicated one due to Ptolemy, and use pictures to explain your argument.

(iii) Then show how the modern picture of planetary motion explains retrograde motion. Again, you should use pictures to explain your argument.

(3) We now consider two key ideas from Greek mathematics, viz., the idea of the infinitesimal, and the idea of an axiomatic system.

(i) Explain what is meant by an *infinitesimal*, and how it can be used to discuss the 'Parable of Zeno', of Achilles and the tortoise, and give a satisfactory resolution of the paradox posed by Zeno.

(ii) Now explain what is meant by an axiomatic system; you should discuss both the formal axiomatic systems and how it is constructed, and the 'interpretation' of the axiomatic system. Then, by way of an example, attempt to give the rules, symbols, and axioms that would allow one to define the game of "Tic-tac-toe". Notice that a picture of tic-tac-toe, with the "O" and "X" symbols, is not what is being asked for here (such a picture would actually be an interpretation of the game, in terms of an image); you are being asked for the kind of information that would allow a computer to generate a game of tic-tac-toe.