**Question:** Discuss why the debate concerning global warming is so difficult to resolve.

**Answer:** The debate concerning global warming is difficult to resolve for a variety of reasons including the following:

1. **Complicated problem to understand**
   The public debate concerning global warming has been hampered to a great extent by the fact that it is an exceptionally complicated problem to understand. For example, over the last 160,000 years there has been a sufficient amount of climate variability to make cogent case that the warming of the earth's surface that has taken place between 1860 and 1990 can be explained away as normal variability. Furthermore, the dramatic carbon dioxide increases that have been attributed to the Industrial Revolution beginning about 1860, is not according to the geologic record unprecedented. There was a similar dramatic rise in carbon dioxide levels about 120,000 years ago. Additionally, what often gets lost to the course of debate, is the distinction between what is natural and what is anthropogenic disturbances and that the rate at which warming may take place is as important as the total amount of warming.

2. **Incomplete information/data**
   The earth is a very large place, with a large diversity of material surfaces (rocks, water, vegetation, etc.). Collecting samples of atmospheric chemistry, temperature, and the other necessary physical measurements in large enough numbers, and with adequate geographic distribution to be robustly representative of what is actually taking place in the atmosphere is problematic. As a result, there is frequently gaps in the databases in both space and in time. These data gaps may mask processes taking place that affect climate change, or at least our understanding of how climate change takes place. These data gaps create genuine uncertainty amongst both skeptics and non-skeptics of global warming.

3. **Complicated models with inconsistent projections**
   The models used to make long-term projections of climate warming trends are both large and complex. They involve estimates and simulations of extremely complicated physical systems such as oceans processes, atmosphere processes, terrestrial processes, and their interactions. Although the general consensus is that many of these models have been validated to a considerable degree, none have been validated to the full satisfaction of any responsible scientist. Furthermore, these models predict a fairly gross range of warming, from as little as 1.5 degree to 4.5 degrees C. This range arguably spans potential impacts that could be described as innocuous on the low-end, and catastrophic on the high-end.

4. **Political and economic agendas**
   Although we tend to think of global warming as a scientific problem, it is actually more a political and economic problem. The politics and economics of the status quo are quite entrenched. Trying to make new political policy and economic adjustments that both except and respond to the realities of global warming takes the kind of political and business leadership that heretofore United States has been unable to Marshall.
Directions: Write an essay answer to the question below. Be sure your answer explicitly addresses the question as posed, is lucid and well organized. Your answer must be no longer than a single blue book.

Questions:

1. Detail the fundamental differences in the views of Julian Simon and Paul Ehrlich with reference to how population growth will affect resource production and consumption, and environmental sustainability…?

2. Analyze the graph provided. Detail the impact on aquatic insect diversity of a typical medium density single-family home development as described in your readings…

3. Detail Thoreau’s notion of a life of “simplicity”… and explain why this notion might be considered “practical” or “impractical” for the 21st century…

Exam Grading Rubric

50% for identification of elements that are clearly pertinent to the question as posed…

40% for the logic, organization, and clarity of your answer…

10% for the quality of your writing…
FIGURE 11: RELATIONSHIP BETWEEN IMPERVIOUS COVER AND AQUATIC INSECT DIVERSITY IN ANACOSTIA RIVER SUBWATERSHEDS

Various macroinvertebrate metrics in 23 headwater stream stations indicate a shift from good diversity to poor diversity as impervious cover increases. Data from Schueler and Galli (1992).

FIGURE 12: FISH DIVERSITY IN FOUR SUBWATERSHEDS OF DIFFERENT IMPERVIOUS COVER IN THE MARYLAND PIEDMONT

The number of fish collected in four small streams declines as impervious cover increases in this data set presented by Schueler and Galli (1992).