Final Exam

Monday, June 6, 8:00-10:59 am, one page (double-sided) of notes allowed. If you use notes, please turn them in with your exam.

Please write your name, student ID number, TA, and section day/time, on each of your answer pages. Answer questions 1 and 2 on separate sheets of paper, and use no more than one sheet of paper for each question.

Answers should be legible and concise. Please clearly answer each numbered/lettered question, and label each part of your answer.

1. [50 points] “More solar energy hits the earth in one hour than all the energy the world consumes in one year,” according to the assigned reading by CalTech chemist Nate Lewis. Lewis goes on to point out that even at 10% efficiency all of US energy needs could be met by paving a 400 km by 400 km square of land with photovoltaic cells. Given that the sun produces so much energy, you might expect that the US should be undergoing a wholesale conversion to solar power.
   a. [25 points] What are the potential drawbacks to using solar power? (You should be able to identify at least 3 drawbacks, drawing on concepts from lecture and reading.)
   b. [10 points] How will the electrical grid need to change in order to accommodate solar power?
   c. [15 points] In what ways might nuclear power appear preferable to solar power for meeting energy needs, and what are potential drawbacks to nuclear power?
2. [50 points] A May 31, 2011 news item on the Smart Growth Online web site reports on Chula Vista’s\textsuperscript{1} new climate adaptation plan:

The city council of Chula Vista recently approved plans to implement strategies to reduce the community’s vulnerability to climate change. The decision made Chula Vista the first local government in Southern California to adopt a standalone, comprehensive climate adaptation plan. Adaptation strategies in the plan include measures to expand the city’s urban forests, incorporate ‘cool’ or reflective roofs, promote gray water and other water reuse, and design future development and municipal projects to be resilient to sea level rise.

Previously, in 2008, the city of Chula Vista had adopted a climate mitigation plan aimed at reducing the city’s greenhouse gas emissions, with measures such as replacing city-owned vehicles with alternative fuel or hybrid vehicles, encouraging installation of solar and renewable energy systems, and setting green building standards.

a. [20 points] In what ways are the issues in Chula Vista’s climate change plans (as listed in this question) relevant to Smart Growth? In other words, why is a Smart Growth web site commenting on this climate change plan?

b. [10 points] What distinguishes the measures in the climate mitigation plan from the measures in the climate adaptation plan?

c. [20 points] In brief, why is the city of Chula Vista concerned about the specific adaptation strategies identified in this summary of their climate adaptation plan? Please answer for two of the four strategies identified in the plan (i.e. (i) urban forests, (ii) ‘cool’ roofs, (iii) gray water and water reuse, and (iv) resilience to sea level rise). For each strategy, you should identify the climate change issue that it addresses, explain why this would be of concern to a Southern Californian coastal city such as Chula Vista, and explain how the strategy might help the city adapt to climate change.

\textsuperscript{1}For geographic reference, Chula Vista is in San Diego County, on the coast, south of downtown San Diego. Given its location, it is likely to experience many of the same climate and climate change issues that UCSD faces.