January 23, 2023

Exam: Final, up to 1.5 hours

Ivo Welch. UCLA Anderson MFE 298 - Climate Change, Winter 2022. January 23, 2023

READ THIS FIRST:

- This exam is closed book, closed notes, closed computer, closed everything, except: Everyone is allowed to bring their own writing on 14 square inches, meaning the size of a standard 3.5" x 2.0" business card, front and back.
- The number in parentheses in front of each question is the number of points. Almost all of them are 3 points.
- You should be able to complete the exam in about 45 minutes. However, you have 90 minutes to answer the questions.
- Pretty much every question can be answered in a sentence or less (and a minute or less). Some are just one word (if applicable/useful, please give a brief 5 word reason why).
- Write extremely clearly. If I cannot understand what you mean, you lose. Generally, try to be concise. If I cannot read your hand-writing, you lose. For a clearly wrong answer, you can receive negative points. The point is to stop you from wild-guessing or snowing me, not to stop you from writing what you really know. If you have no clue about the answer, you are probably better off leaving the answer blank. If you have some clue, give it your best shot. I will liberally subtract points for wrong answers—in particular, I hate the idea of 3 different answers, one of which is correct, two of which are incorrect — unless you clearly outline assumptions that you have to make because my question is ambiguous.
- Write your answers in the spaces below the questions.
- If you believe a question is ambiguous, please make reasonable assumptions, and spell them out in your answer. I may also deliberately include questions that cannot be answered. If you believe this is the case, please explain why you cannot answer a question.
- When questions are about the future, it means to ask "Is the widespread consensus of scientists that..."

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1. (1) What is your name, UCLA email address, and student id?

2. (1) What are the two most harmful words in the English language, accdg to Fletcher?

3. (3) What fraction of world emissions are from OECD and non-OECD countries?

4. (3) What is the key problem with United Nations COP solutions?

5. (3) How much has Earth warmed since the preindustrial times?

6. (3) How much is Earth expected to warm from now to 2100 under benevolent neglect (RCP 6-7)?

7. (3) How much is Earth expected to warm from now to 2100 under concerted climate change action (RCP 4-5)?

8. (3) Where on the planet has most global warming occurred sofar?

9. (3) What part of water vapor's role in warming is still unclear?

10. (3) How long has Earth been in an ice age?

11. (3) What year did the curve in the hockeystick change?

12. (3) When have humans and civilization survived larger temperature changes? How much?

13. (3) What are the key problems with warming now compared to in the past (say, many thousand years ago)?

14. (3) How much will sea levels rise by 2100?

15. (3) Is climate change expected to be harmful? If so, by how much relative to what?

16. (3) What is the expected net cost of climate change to the United States?

17. (3) What countries will experience most population growth this century?

18. (3) What countries will experience most emissions growth this century?

19. (3) Since the industrial revolution, what part of worldwide emissions growth has been due to population growth, wealth growth, and (in-)efficiency growth?

20. (3) How many tons of CO_2 per year does the world emit ca 2020?

21. (3) How many tons of greenhouse gases per year (with land charge) does the world emit ca 2020?

22. (3) Will stone weathering and ocean calcite remove human excess CO_2 emissions? If so, what's the problem? If not, why not?

23. (3) How do per-person emissions and income in China compare to Europe?

24. (3) What is an IAM?

25. (3) What is the key input disagreement among IAMs users?

26. (3) What is the key output disagreement among IAMs users?

27. (3) What would be the effect of a \$50/tCO_2 tax on the price of gasoline?

28. (3) How do IAMs typically handle population growth and income inequality?

29. (3) What are the two main criteria that viable climate-change actions must fulfill, at least according to your instructor?

30. (3) Would the world be better off with a global emission tax?

31. (3) Why is the Montreal Treaty not a good analogous example for a CO_2 treaty?

32. (3) Why is NATO not a good analogous example for a CO_2 treaty?

33. (3) What do ESG ratings do and do not measure with respect to climate change?

34. (3) Did this class teach you that it would be harmful to Earth if you reduced your carbon footprint?

35. (3) Did this class teach you to be against a global carbon emissions reduction treaty?

36. (3) By and large, are U.S. economists in favor of a U.S. CO_2 tax?

37. (3) What's the problem with temperature and CO_2 graphs over hundreds of thousands or millions of years to show how CO_2 influenced temperature?

38. (3) Could reforesting make a reasonable difference when it comes to global warming?

39. (3) Have global climate models always predicted well or badly?

40. (5 [Bonus]) How much would it cost to reduce Earth's equilibrium temperature by about 1°C via CO_2 emissions reductions?