**CCS 203 2009**

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ FIRST Exam**

**Answer each question concisely but completely, answering all parts of the question for full credit. Each question is worth 10 points.**

1. Give 3 causes of natural variability in climate over the last 1000 years.

-Global Dimming

-Volcanoes

-El Nino

-Milankovitch Cycles

-Meteorites

2) Under what conditions might a forest change from being a carbon sink to a carbon source?

-Age

-Disturbances

1. Describe 3 ways that glaciers are measured to determine if they are advancing or retreating. Are any glaciers on Earth now advancing?

-sensors on glaciers

-visual observations and measurements

-Remote sensing

-Ice cores

-measuring water under the glacier

-concentrations in the ice of gases and particulates

-Yes, there are some advancing

1. What is the difference between weather and climate?

* Weather is the day to day variation that we see everyday, and climate is the long term trends.

1. Explain the Greenhouse Effect. What role do greenhouse gases play in the Greenhouse Effect? List three of the major greenhouse gases.

* Radiation that is let off by the sun reaches the atmosphere as short wave radiation, mainly in the visible light spectrum. The gases in the atmosphere are selective absorbers and permits the majority of the shortwave radiation through As it is absorbed clouds, particulates and the Earth it is reradiated in the form of Longwave radiation which certain gases (green house gases) are very good at absorbing. So lots of this longwave infrared radiation is absorber and is used to heat the Earth.
* CO2, Methane, Water vapor, nitrous oxides, CO, fluorocarbons, nitrogen oxides

6) What happens to solar energy when it hits the land surface? What physical attributes of the land surface determine the surface temperature?

- It is absorbed and reradiated as long wave radiation, or reflected as short wave.

- albeido, moister, vegetation, topology,

7) Describe three ecological impacts that current climate trends have had on Montana’s natural ecosystems.

- Shift in temperatures, More precipitation coming in as rain than snow, beetles, fires, species encroachment into higher elevations, lower stream flow, earlier peaking stream flows, longer growing seasons, change in NPP, earlier snow melt, longer and drier summers

8) How can biospheric primary production be increased to feed the additional 2+ billion people in the next few decades?

-Engaging more land

-Irrigation/fertilization

-Genetic improvements

9) What was the concept behind fertilizing the ocean with iron fillings? Did it work? What climate change impacts are currently most important to the oceans?

- The iron would create a large growth of plankton which would act as a carbon sink, then they would die and float to the bottom where the carbon would be sequestered for several years.

- A large growth of plankton grew but they died at the surface and released all of the carbon

- acidification, coral bleaching, desalinization of upper Atlantic, sea level rise, sea temp rise, change in npp,

10) What are “proxy records”? List three types of "proxy records" used in paleoclimatology, and describe the kind of information that can be inferred about the climate from that record.

- Data used to determine a measurement in place of actual imperial evidence.

- Geological, biological, cryological, historical (ice cores, sea cores, coral cores, paintings, writing, Sediment structures & material (loess), Glacial Moranes, lakes sediments, Coastal & Deep Ocean sediments, fossils or dead material, tree cores, critters, volcanic ash, banded iron in soils, red beds