Study Guide, GEOL/ESS 2000, Exam III (will take place during class, Nov. 17, 2017)

Some basic preliminaries:

1) I am interested in whether or not you understand the general concept – I'll usually give you equations or data that you may need for a calculation.
2) It is obvious that the third exam will cover the material since the second exam that we have covered in lecture up to this time (Chapters 7, 8, 9, some of 11). Concepts from lab are also likely to be on the exam.
3) There WILL BE simple quantitative problems on the exam. It will be possible to solve the problems without a calculator (calculations provided).

-p-waves, s-waves, the structure of the Earth in terms of major layers
-Plate tectonic features – mid-ocean ridges, subduction zones, transform faults, hot spots
-Be able to calculate a rate of plate motion

-CO_2 in the atmosphere – why up and down every year, but going up over the longer term
-Carbon residence time in the atmosphere with respect to different carbon cycles
-Main features of the short-term and long-term organic carbon cycles
-Reduced and oxidized forms of a few elements
-Respiration and Photosynthesis, nutrient cycling
-Chemical weathering and the long-term inorganic carbon cycle
-Main features of the short-term organic carbon cycle AND long-term organic carbon cycle
-Reduced and oxidized forms of a few elements
-Respiration and Photosynthesis, nutrient cycling
-Chemical weathering and the long-term inorganic carbon cycle
-Basic ways of making a living (especially if you're a microbe):
Autotrophy, heterotrophy; Photosynthesis, chemosynthesis;
Respiration (aerobic and anaerobic); Fermentation
-Methanogenesis, methanogenic bacteria – role in early atmosphere?
-Denitrification; advent of cyanobacteria and modern photosynthesis
-Implications of photosynthesis (i.e., oxygen relation to organic matter)
-Ecosystems: Population, community, species, ecotone, trophic level
-Photosynthesis rate as a function of CO_2 concentration (relevant to today's CO_2 rise)
-Measures of biodiversity, including Simpson's diversity index
-Heterotrophy, autotrophy, oxygenic photosynthesis, aerobic respiration, fermentation, methanogenesis

NOT SURE how much of this we'll get to:
-Genomic tree of life; "last common ancestor"; how did Earth's earliest life make a living?
-Endosymbiosis, heterocysts
-Isotopic fractionation, relation to existence of life on Earth, formation of organic matter
-Evidence for the rise of oxygen in Earth's atmosphere
-Ozone in Earth's atmosphere
-Relationship between atmospheric oxygen levels and burial of organic carbon; forest fires
-Ocean biological pump in relation to oxygen feedback
-Faint young sun paradox revisited, constraints on greenhouse gas concentrations; feedbacks
-Logistic growth