Introduction to Geophysics
Review for Exam 2

Chapter 4

1. What is the difference between a wave, a pulse and a ray?
2. What is the relationship between velocity, frequency and wavelength?
3. Describe the particle motions of the different body waves.
4. How do we know that the Earth is layered, like an onion?
5. What is Snell's Law? Be able to calculate angles or velocities using Snell's Law.
6. What is the ray parameter? Why is it important in ray tracing Earth's velocity-depth structure?
7. Be able to describe the general velocity structure of the Earth.
8. What do the letters P, S, s, p, I, K, and c mean with respect to earthquake body wave phases? What would PcS mean? What would PKIKP mean?
9. Be able to draw a diagram illustrating the major features of the Earth's interior. How did we discover these various features?
10. What happens to seismic waves as they encounter boundaries in the subsurface (see p.34).
11. What are the Zoeppritz equations?
12. Review the handout on elastic moduli. Which are used to compute the velocities of P- and S-waves? Which is related to the fact that S-waves cannot travel through fluids?
13. What are the three ways waves lose seismic energy?
14. Describe how the study of earthquakes has contributed to our knowledge of the Earth's interior.
15. What is seismic tomography? What can it tell us about the interior structure of the Earth?
16. Also answer questions 2, 3, 4, 5, 11, and 15 on p.40-41.

Chapter 5

17. What is an earthquake?
18. What types of instruments are used to record earthquake waves?
19. What is the general procedure for locating an earthquake?
20. What is a focal mechanism? How is it related to the first motion of arriving P-waves at seismic stations?
21. Be able to draw/describe the "beach ball diagrams" associated with different types of motions along faults.
22. What is seismic moment? How is it related to the energy release of earthquakes?
23. Describe the particle motions of the different surface waves.
24. What are some of the magnitude scales used in earthquake seismology? Be able to list and describe them.
25. How are magnitude and intensity different? What scale is used for intensity?
26. How can we mitigate the damage caused by earthquakes?
27. Also answer questions 1, 2, 4, 8, and 13 on p.63-64.

Chapter 6

28. What is a critical refraction? How is it related to the critical angle?
29. What is the relationship between the critical angle and the velocities of the layers involved?
30. What is Huygen's Principle?
31. Know the basic principles behind the analysis of single-layer and multi-layer refractions.
32. Given a T-X graph, describe how to get the layer velocity and depth to a single horizontal layer.
33. How is the process different for multiple horizontal layers?
34. What has to be **done in the field** to determine if a layer is dipping?
35. Given a T-X graph, describe how to determine velocity, depth and the dip angle and direction.
36. What are some types of energy sources used in refraction seismology?
37. How are surveys conducted at sea different from those on land?
38. What are the Plus-Minus and Generalized Reciprocal methods? What advantages do they have over standard refraction data analysis?
39. What is a "hidden layer"? Why are they important?
40. How would an offset in a refracting layer look on a T-X graph?
41. What information can be gained by fan shooting?

42. Also answer questions 2, 4, 5, and 7 on p.82-83.

Chapter 7

43. Know the following terms: source, receiver, offset, shot gather, common midpoint, fold, ground roll, multiple, NMO and airwave.
44. What does a recording system do to the data?
45. What is acoustic impedance? Why is it important in producing reflections?
46. Be able to calculate reflection and transmission coefficients given the appropriate information.
47. Be able to identify the different arrivals on a T vs. X reflection curve.
48. Be able to describe 2-D reflection geometries for planar and dipping layers.
49. How are 2-D and 3-D survey methods different? Which would give you the most complete information on the subsurface?
50. What is the Peterson Model? Why is it important?
51. What is convolution? Why is it important in reflection seismology?
52. What is a synthetic seismogram? (p. 98)
53. What must be done in order to get the best vertical or time resolution? How does the Fresnel Zone affect horizontal seismic resolution?
54. **Know the different steps in reflection data processing in order.** You should also be able to describe what each process does to the data.
55. What are the different kinds of velocity?
56. What is migration? What does it do to the data? Be able to describe the changes to regular stacked data a good migration operation can achieve.
57. Explain the following statement: All seismic data are dip filtered.
58. What are some interpretation pitfalls?
59. What are some types of hydrocarbon traps that can be detected by reflection seismology?
60. Describe sequence stratigraphy and its relationship to sea level change.
61. How could you use seismology to determine if an active magma chamber were beneath a volcano?
62. Also answer questions 2, 3, 6, 7, 8, 9, 11, 14, 16, 17, 18 and 19.