Review for Exam 3

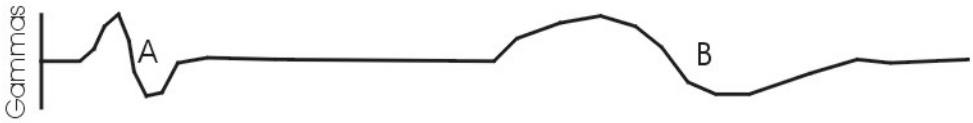
1. Answer questions 7, 8, 12 and 18 on p.124.
2. Give three applications of gravity surveying.
3. What are the units used to describe gravity anomalies?
4. Explain why gravity varies with latitude.
5. Describe the difference between measurements of absolute and relative gravity.
6. In general, which has the lowest and highest densities: unconsolidated sediments, sedimentary rocks, igneous rocks and/or metamorphic rocks?
7. When theoretical or normal gravity are calculated, what does the final number mean?
8. Describe the different "corrections" commonly made to gravity data.
9. In what kind of situation would it be necessary to make an Eötvös correction?
10. What are regional and residual anomalies? What does each of these represent?
11. Determine the simple Bouguer gravity anomaly at the following stations:

Station	Time	Dial Reading	Elevation (ft)	Latitude
Base	8:10	896.31	1798	36° 38.67'
1	8:26	925.93	1820	36° 39.50'
2	8:45	907.89	1750	36° 39.23'
3	9:00	908.92	1770	36° 38.85'
Base	9:17	897.03	1798	36° 38.67'

Assume the dial constant for the gravimeter is 0.3802 and that absolute gravity at the base station is 979701.18.

12. Determine the gravity anomaly directly over a buried sphere with a radius of 5 m buried at a depth of 20 m with a density contrast of 0.4 g/cm^3. Repeat the calculation for a horizontal cylinder with the same dimensions, depth and density contrast.
13. Estimate the depth of buried sphere if the half-width of the anomaly is 5 km.
14. Answer questions 2, 4, 7, and 9 on p.138.
15. Describe the Airy and Pratt models of isostasy.
16. Compared to the actual Earth, which model of isostasy is a better model? Explain your answer.
17. What is the geoid?
18. Answer questions 4, 7, 12, and 16 on p.160.
19. What type of gravity anomaly would be expected over a large body of magnetite? Would this same body produce a magnetic anomaly? Why or why not?
20. Assuming the anomalies were measured at mid-latitudes, describe how the gravity and magnetic anomalies in the previous question would be different from each other.
21. What units are used to describe magnetic anomalies?
22. What is χ (or k) and why is it important?
23. Describe the difference between induced and remnant magnetism. What types of remnant magnetism are there?
24. What is the difference between a ferromagnetic, a diamagnetic, and a paramagnetic substance?
25. In general, which has the lowest and highest average magnetic susceptibilities: sedimentary rocks, metamorphic rocks, acid igneous rocks and/or basic igneous rocks?
26. What three things define the total magnetic field vector?

27. Where is ~90% of the magnetic field generated? What makes up the other 10% of the field?
28. Answer questions 3, 7, 8, 10, 12 and 14 on pp.179-180.
29. What is the IGRF and why is it important?
30. For these magnetometers – flux gate, proton precession, and optical absorption – a) describe in general how each of these works, and b) what specific quantity is measured by each of these different magnetometers in order to determine the magnitude of the field.
31. Using the program at http://www.ngdc.noaa.gov/geomag-web/#igrfwmm, obtain values for the seven components of the Earth's magnetic field at 32º N, 84º W, elevation 400 feet, for April 1, 1915 and 2015. What was the change in each component over that time?
32. What are some general field procedures for a magnetic survey?
33. What is the Königsberger Ratio?
34. What are some qualitative ways that magnetic maps and profiles can be interpreted?
35. What happens to the anomalies of simple bodies buried and different depths and oriented in different directions in the Earth's field at different locations on the Earth (magnetic equator, mid-latitudes, magnetic north pole, magnetic south pole?
36. The picture below shows a profile with two distinct magnetic anomalies (A and B). Both sources have the same size, shape and direction of magnetization. Which source body is deepest? Which has the strongest magnetization? Explain your answers.



37. What are upward and downward continuation and how are they useful in analyzing magnetic data?
38. What is reduction to the pole and how is it useful in analyzing magnetic data?
39. What is magnetic gradiometry and how might it be useful in an archeological survey?
40. Be able to describe at least two ways that magnetic data can be analyzed and interpreted.